

COOP'S TECHNOLOGY DIGEST

-A Timely Report On The *World* Of Communications-

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COOP'S TECHNOLOGY DIGEST

DECEMBER 17, 1993 / Volume 93-12

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The transmission of television programming, via terrestrial VHF and UHF transmitters, has been a less than fully successful interlude of communications history. Very complex schemes, adding to the cost of transmission and reception, created to reduce interference between separate terrestrial transmitters have largely been ineffective. Uniformly planners in the 40s-60s underestimated the number of transmission (TV) channels required to properly serve a country and with often disastrous results additional transmitters have been approved where too many already existed. The reception quality of television has gradually deteriorated, especially in rural areas 50/75 km from the nearest major transmitter sites.

As G.H. (Hugh) Railton (Manager Engineering Services, Communications Division, Ministry of Commerce) told attendees at a New Zealand On Air (NZOA) *'Workshop On the Expansion of TV3'* November 9th:

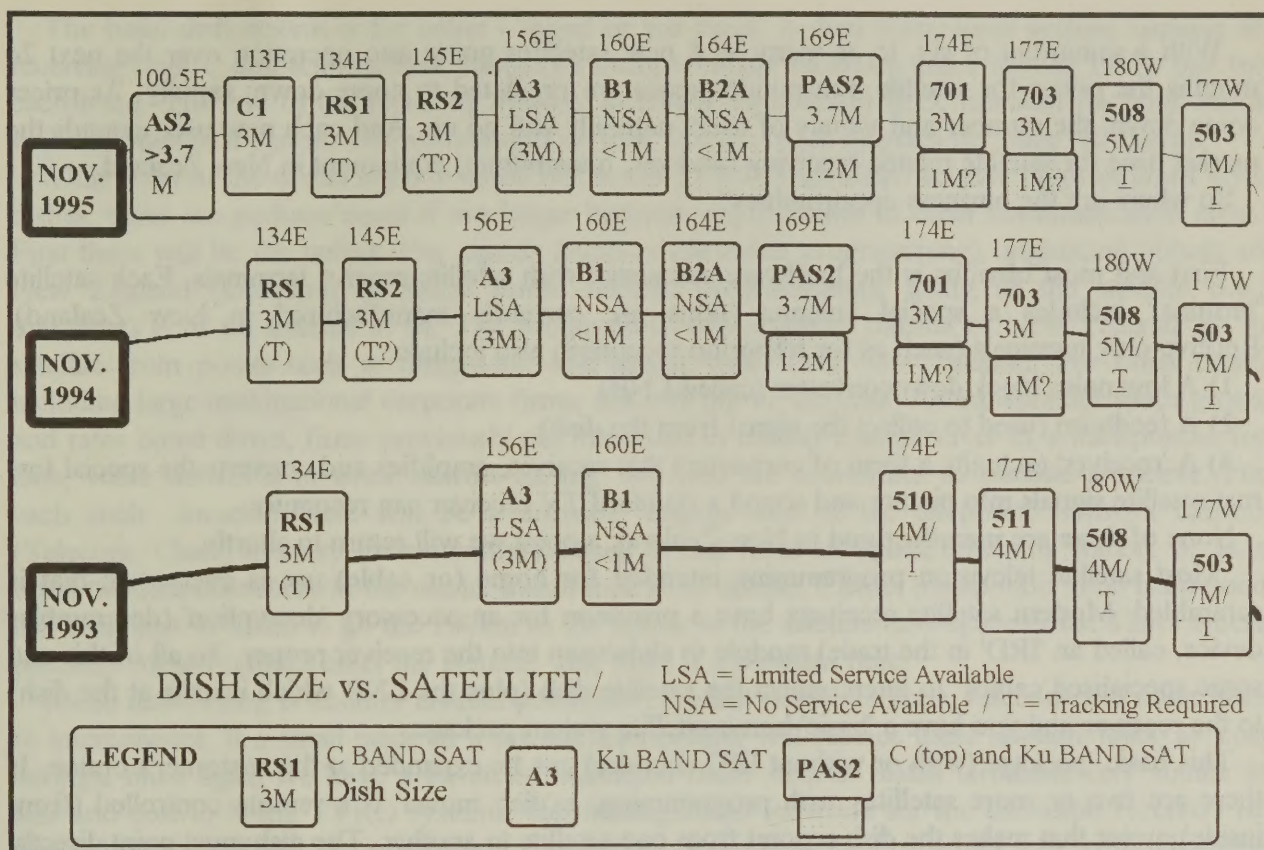
"Experience has shown that in rugged terrain, at least two translator frequencies (are required) per programme. When this is taken along with the constraints on frequency usage like adjacent channel interference, the 11 VHF channels available for TV1, TV2 and TV3 are possibly insufficient."

Railton went on to suggest that for TV3 to have absolutely the same 'coverage opportunities' now enjoyed by TVs 1 and 2, New Zealand should have not fewer than 12 VHF channels (as opposed to our present 11).

This problem, lack of adequate frequencies for VHF (and UHF) terrestrial coverage, is hardly unique to New Zealand. Thailand, not often ranked highly as a technological powerhouse, will this month launch the first of two 'domestic satellites' to provide national television (plus radio and telephone and cable TV services) to its people. Greece, also not a modern technology innovator, is launching a pair of domestic satellites for the same purpose; overcoming the limitations of terrestrial (VHF + UHF) television coverage. In our region of the world, similar 'national' satellites are under construction for Malaysia, Korea and Papua New Guinea. Australia, Indonesia and Japan already operate such 'national' satellites.

As discussed in CTD for November (CTD:9311/1) New Zealand's use of satellites for any purpose has to date been very limited. A major reason for this has been a lack of available satellites. Unlike Europe (where 25 satellites now provide service), New Zealand has been offered the services of two old (i.e., tired, not fully functional) Intelsat satellites and the very rare, occasional (and expensive) use of a small segment of two Australian satellites. This has not en-

1/CTD 9311, still available at \$30 from Robert B. Cooper, P.O. Box 330, Mangonui, Far North, New Zealand



couraged the development of a satellite communications industry here, nor has there developed a television-by-satellite reception industry here.

But, as reported in CTD for November, several new, more powerful satellites will go into service between next month (January 1994) and the end of 1995. In the two satellite 'bands' (C: think of it as 'VHF', and, Ku: think of it as 'UHF') the number of available (to New Zealand) satellite transponders will mushroom dramatically. At 'C-band', from our present 12 transponders (available for use) we rise to 64 in one year, 115 in two years. At 'Ku-band' from 0 available for use (Australia has 8 designed to serve New Zealand, but they are priced as to be 'not available') today to 28 available in one year and 32 available in two years. Net gain: From 12 available transponders to 147 available, a gain of 1,131%.

THE BUSINESS OPPORTUNITIES

There are two primary constraints to the development of a satellite industry. First there is the lack of available satellites; or transponders (channels). You can have no industry if there is no space for it. Lacking sufficient transponders, even those who might wish to use satellites have no opportunity to do so. The second constraint is price. When there is a shortage of any commodity, prices go up. So too with satellite transponders. Our present shortage, which has been the case since the mid 70s, has kept 'use rates' for 'transponder space' very high; the highest in the world in fact.

The present 12 transponders in use reflect users who are willing to pay the price at any cost when faced with paying, or, not reaching customers for their products. Thus firms such as CNN, ESPN, American networks ABC, CBS and NBC, the Voice of America and the BBC have paid top dollar to use the very limited space available.

With a minimum of six, to as many as 8 new satellites going into operation over the next 24 months the prices for satellite transponder space are predicted to come down; rapidly. As prices come down, the number and variety of users naturally will go up. And each new user extends the market base for satellite related receiving (and yes, transmitting) equipment in New Zealand.

So where are the business opportunities?

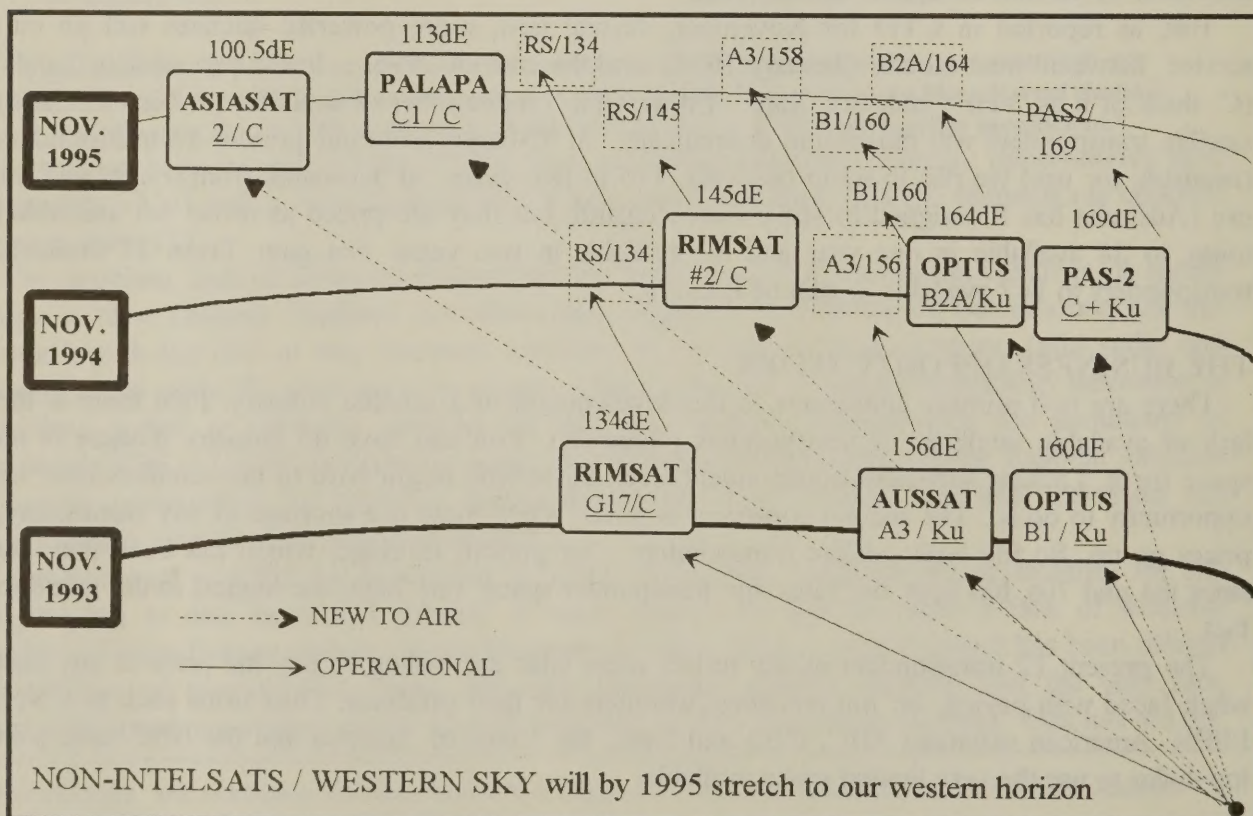
First and most obvious is the hardware associated with satellite receive terminals. Each satellite 'terminal' includes a special antenna (none are currently manufactured in New Zealand). Receive-only terminals (such as for television reception) also include:

- 1) A low noise block downconverter (called LNB)
- 2) A feedhorn (used to collect the signal from the dish)
- 3) A 'receiver' (actually a form of converter) that receives, amplifies and converts the special format satellite signals into picture and sound a standard TV receiver can recognise.

None of these are manufactured in New Zealand; a point we will return to shortly.

Most satellite television programming intended for home (or cable) use is encrypted; that is scrambled. Modern satellite receivers have a provision for an accessory 'decryption' (descrambler device, called an 'TRD' in the trade) module to slide/snap into the receiver proper. To all of this add some specialised cables to interconnect the satellite dish (plus the LNB which installs at the dish) to the receiver and you have a 'basic' home satellite system package.

This basic package (with or without IRD decoder) can be expanded at the customer's option. If there are two or more satellites with programming, a 'dish mover' is a remote controlled (from inside) motor that makes the dish repoint from one satellite to another. The dish must point directly at the satellite to be received or there is no reception. By the end of 1995, most New Zealand home dishes will probably opt for a dish mover.

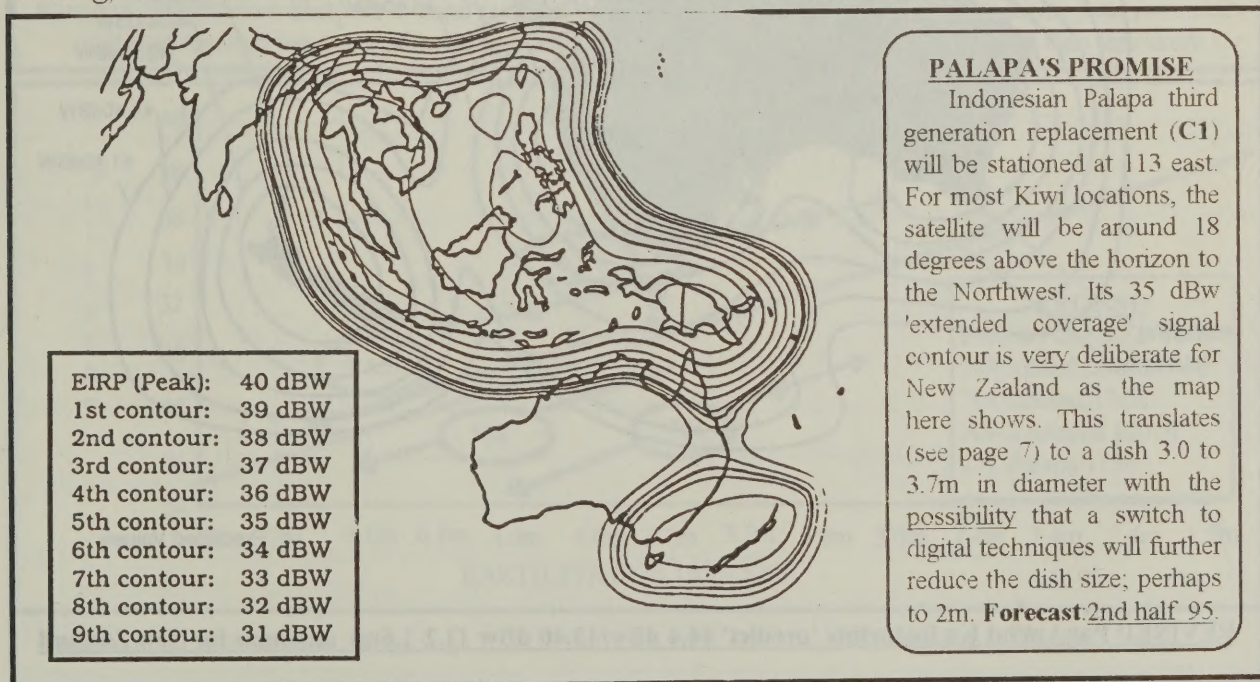


The basic dish system is for either C-band or Ku band. A dual (two) band system, capable of receiving both C and Ku satellites, requires a more complex feedhorn and a second LNB; one for each band. The rest of the receiving system, including the receiver/IRD, function for both bands with the push of a button. The system options look like the block diagram on page 10 (here).

While most of the media hype to come will be on TVRO (television / receive only) or home style dishes, there are perhaps equal if not larger business opportunities in other communication areas. First there will be the uplink. For signals (such as television programming) originating outside of New Zealand (including all initial home satellite programming), going to the satellite (i.e., uplinking) is of no interest to us. The programmes will originate outside of New Zealand, go to satellite from points such as Singapore, and simply wash over New Zealand. For other users, including large multinational corporate firms, this will not be the case. As transponder space grows and rates come down, firms previously not interested in leasing a small sliver of a transponder for data, voice networks or even 'narrow-casting' will find the economics of satellite attractive. For each such location there will be a decision: engage one of the telephone network carriers (Telecom, Clear) to carry their communications to and from an uplink/downlink station, or as is often the case elsewhere in the world, install their own uplink. 'Cheap' transponder time is no good if it costs just as much to go the 100km to the uplink as the satellite time/space costs. That's where privately owned uplinks enter the picture. Yes, there is a business here.

Radio networking is another distinct possibility. Present networks lease Telecom and other links to interconnect. If a small piece of a satellite transponder will replace these landline links, at cost savings, once again we have a business. Individual radio stations install terminals very similar in size and cost to home TVRO systems, substituting audio receivers for the television receivers (at about the same price). The quality will certainly be better than they presently have with telephone line links and if the cost is lower ... there's another business here as well.

Businesses requiring more bandwidth between offices or facilities than the telephone company can economically provide is yet another business opportunity. Even with data compression, most pure-copper wire interoffice links are often limited to a range under 20 Kbits/second. Modern banking, credit card transactions, ATM machines and even fast food franchises often require



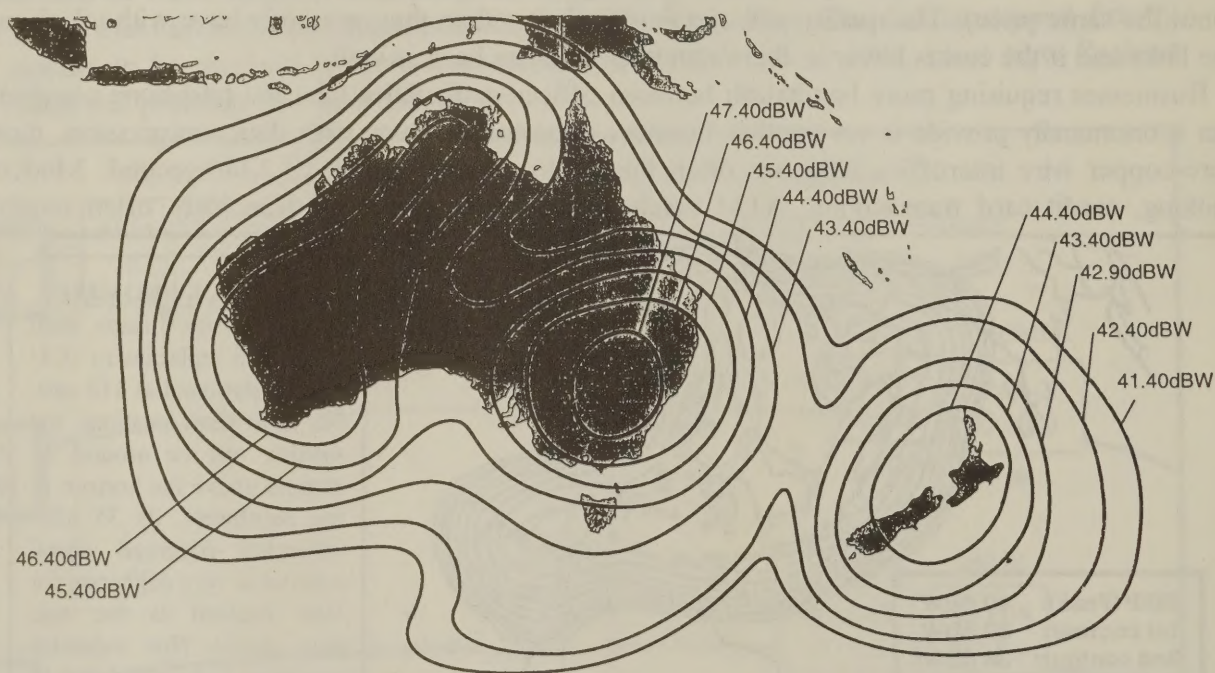
dedicated networks functioning well past normal office closing time to get that day's data transferred. A satellite link using small antennas (.6m at C-band, smaller at Ku) easily handle Mbits/second. Faster data transfer, better business controls. These are called V-SAT terminals and yes, there is a business here too.

The 'ultimate' business venture is to rent a transponder on a long term contract at the best 'wholesale rate' and then market its space (bandwidth capacity) to firms that require something less than a full transponder for their own uses. By 'bundling' multiple users through a single transponder, you make a profit by charging more for the bandwidth-sum of smaller bandwidths than you pay for the full bandwidth. There are ancillary revenues as well such as providing an uplink service (combining all of your renters into a single uplink signal), leasing the ground receive terminals and providing technical consulting services.

MANUFACTURE OR DISTRIBUTE?

As you might suspect, with up to 13 years head start in producing the bits and pieces that go into satellite receiving (and transmitting) systems, any country with an established microwave technology base is going to have a significant edge on manufacturing products at low cost.

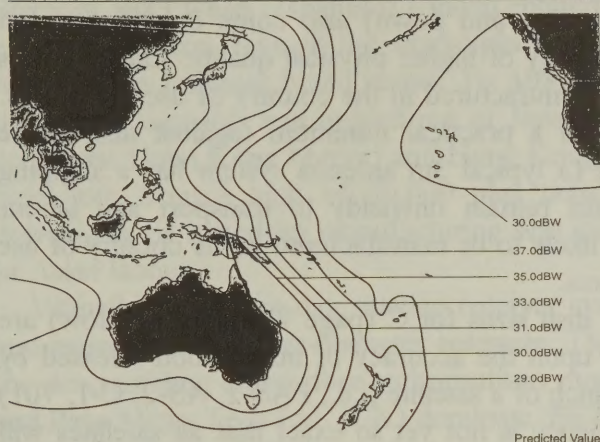
PanAmSat Pacific Ocean Region Australia/New Zealand Ku-Band Downlink Beam



Predicted Values

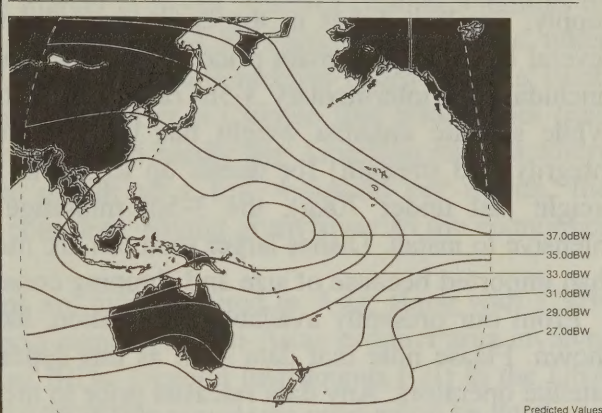
REVISED PanAmSat Ku footprints 'predict' 44.4 dBw/43.40 dBw (1.2-1.6m) antennas for New Zealand

PanAmSat Pacific Ocean Region
Asia Pacific C-Band Downlink Beam



REVISED PAS-2 C band/Asia-Pacific beam: 30 dBW
- 3.7-4.6m antennas (Australia 2.4m!)

PanAmSat Pacific Ocean Region
Oceania C-Band Downlink Beam

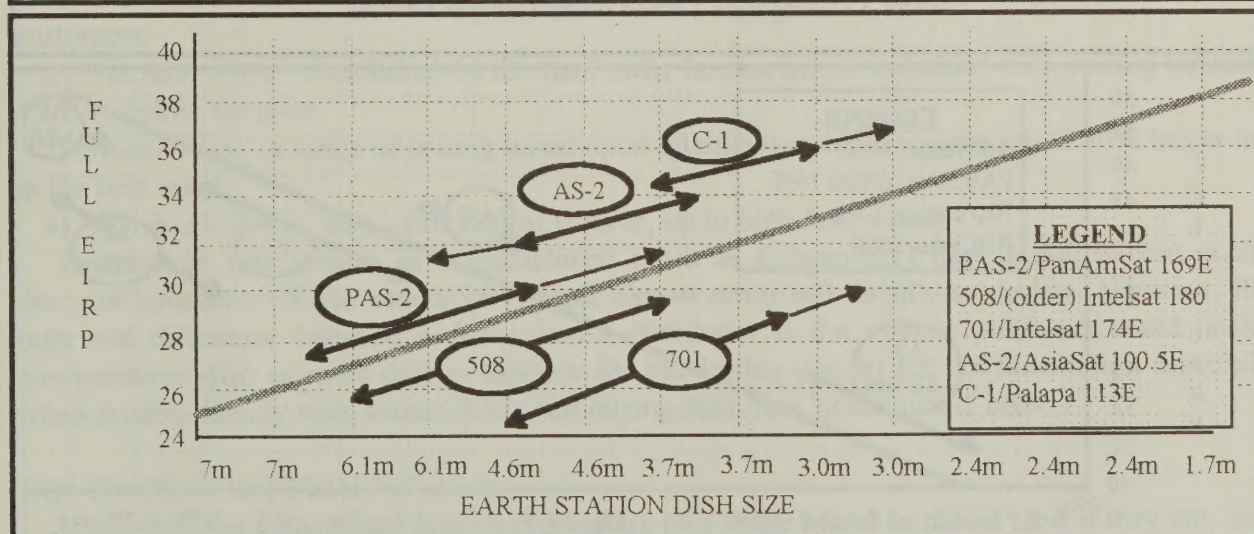


REVISED PAS-2 C band/Oceania beam: 28-29 dBW
- 4.7-6.1m antennas (Singapore 2.4m)

Most of the original design work on products such as satellite receivers, LNBs, feedhorns and V-SAT terminals originated in the United States. By 1985 much of this technology had reached 90% of its present technology plateau; the changes in the last 8 years have been primarily due to large scale integration (LSI), or the reduction in small parts by designing specialised 'large chips' that perform the work previously done by dozens or hundreds of separate transistors and ICs. In the Bytes section of this issue, for example, we report on a set of four chips recently introduced by Philips; 'super chips' which, when combined, essentially create a complete satellite television receiver.

NEW ZEALAND C-BAND EARTH STATION ANTENNAS

Range of antenna sizes likely for C-band satellites discussed in text. See footprint maps to locate your own area's predicted eirp (left hand column). Go right until meeting solid grey line, then down to find dish size likely.



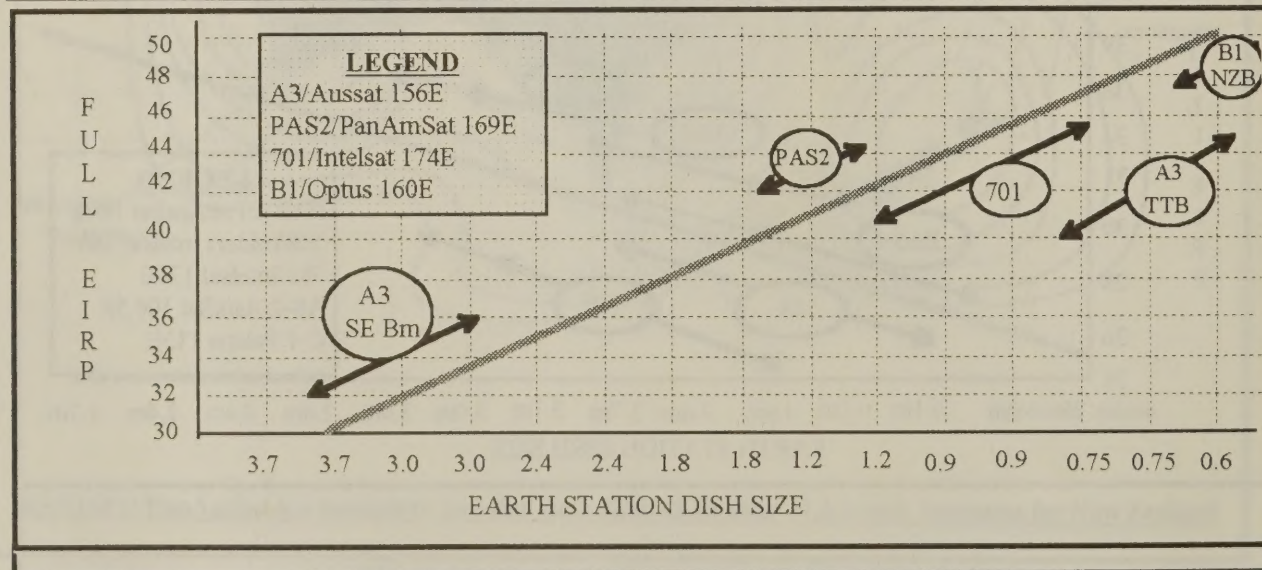
Satellite receivers, LNBs and feedhorns are now essentially assembled in the lower labour cost Asian countries; Hong Kong, Taiwan, Korea and China produce an estimated 87% of the world's supply. Satellite dishes in the easily exported sizes (3m and down) also come out of Asia but several US sources remain price competitive and usually of higher physical quality. Larger dishes (including the intermediary 3-5m range) are either manufactured in the country of use or the US. While satellite antenna weight has been reduced to a practical minimum (against dish shape integrity and strength) for dishes up to 3m in size (a typical 3m antenna system has a shipping weight just under 70kg), the 3-5m midrange sizes remain unwieldy to transport and labour intensive to install. Dishes larger than 5m are more likely to be manufactured in the country of use than imported because of size and shipping constraints.

From our presently available information, likely dish sizes for C (page 7) and Ku (below) are shown. Please note that data such as this depends upon the accuracy of information released by satellite operators. Any data released prior to the launch of a satellite (i.e., PAS-2, AS-2, C-1, 701) will be subject to after-launch verification. The science is not yet so exact that all satellites will operate precisely as was forecast in advance of launch.

Distribution, then, of perhaps all parts but the antenna proper seems likely in New Zealand. For antenna manufacture one needs access to aluminium round and rectangular tubular stock, perforated or solid sheets (to form the reflector surface), fasteners to attach the reflective surface to the parabola shaped frame work, steel for the antenna mount and the equipment plus skills to work this raw material into a relatively precision design. Because of transport problems antennas larger than 1m are typically done as 'kitsets' for assembly at the installation point. And there is the surface protection challenge. A mixture of steel and aluminium begs corrosion. Electrostatic 'powder coating', or sun-weather tough painting of parts is mandatory.

NEW ZEALAND Ku BAND EARTH STATION ANTENNAS

Subject to rain-fade allowances Ku band antennas required vary from 3.7m (when receiving Aussat A3 on it's SE Australia beam) down to 0.6m (Optus B1 when on New Zealand beam) with PanAmSat (PAS2), Intelsat 701 and Aussat A3 (using trans-Tasman beam) falling in between.



THE DISTRIBUTION CHAIN

Manufacturing (OEMs/Original Equipment Manufacturers) began the shift from the United States in 1983 when (Japanese) Uniden entered the market in North America. Within 9 months of entering, Uniden 'owned' the marketplace and had been joined by Panasonic, DX and other recognisable Japanese brand names. By 1985 much of the mundane receiver board 'stuffing' (with parts) and assembly had moved out of Japan to subcontractors in Chinese free trade zones (just across the Hong Kong border) and Hong Kong. And by 1986 hardly any American manufacturers were left; from a high of 50,000 plus units per month to a few thousand per month, the downsizing of American manufacturing was quite complete, having given away to the economies of Asian labour.

Virtually all present day satellite receiver systems are manufactured in Asia; along with LNBs and many of the smaller diameter antennas. The most significant non-Asian product area involves the descrambling (subscriber authorisation) modules; IRDs. General Instruments (GI) in the USA and Pace Micro Tech Ltd. (UK) dominate this field with major non-Asian production facilities.

Most Asian manufacturers have contracts to build specific receivers (or receiver boards with final case assembly elsewhere) with two or more brand names. Many of these same Asian firms also manufacture their own receiver brands, often a composite of several receiver boards built for others on their production lines. Satellite receivers have matured to the point where there are few 'proprietary features' found only in a single brand/model; features found in one are duplicated by other brands. Brand loyalty does exist but primarily at the top end (Chaparral for example) of the pricing chain. It is usually possible to find less well known Asian OEM brands, containing most or all of the desirable features associated with top-end 'super receivers,' at significant discounts.

With a US base, the major distributors are 'world class' operating in Europe, Asia and North America. Echosphere, for example, began in 1981 as a small regional distributor in Colorado. Today the firm has a major world market share with its own full line of receivers. While each distributor has its own entry-level requirements for dealers, typically to become a dealer requires purchasing some minimum quantity of goods (such as three complete or equivalent systems).

Pricing is competitive between equipment lines and there are generally speaking four-levels of pricing:

- 1) *List Price* / established by the OEM and used by dealers when quoting systems to retail customers;
- 2) *Discount Price* / established by the mail order houses (more to follow) with pricing typically 15-20% below list price.
- 3) *Dealer Price* / a range of pricing based upon quantity/volume discounts, up to 40% below list in the best case.
- 4) *Distributor Price* / also a function of volume, up to 60% below retail.

Distributors who double as manufacturers (such as Echosphere) have a double-shot at the discount structure. OEMs, unless very small, almost never sell directly to dealers. However, the only real difference between a dealer and a distributor is the volume purchased and dealer co-operatives (two or more dealers together for purchasing power) are not uncommon especially when dealing directly with Asian OEMs and buying their own 'house brand' units.

EQUIPMENT DIFFERENTIALS

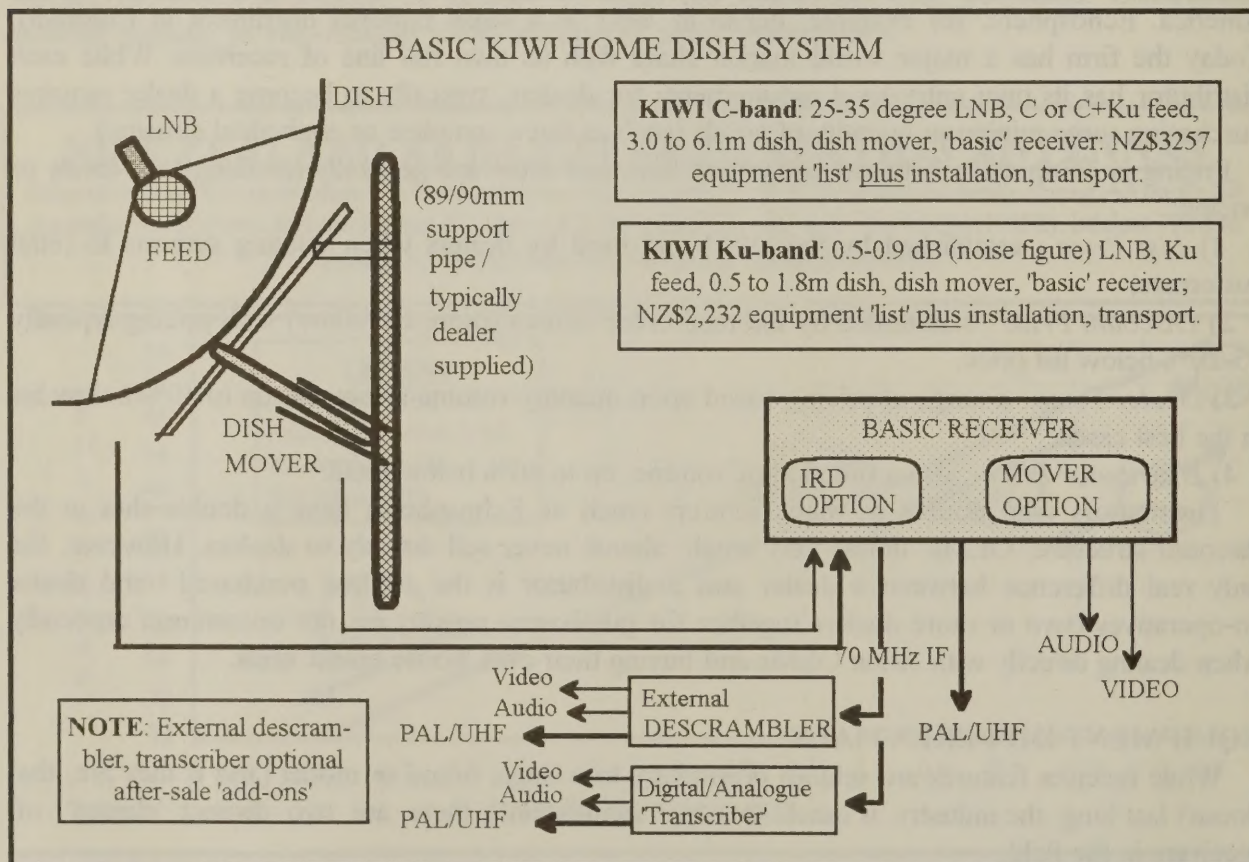
While receiver features are seldom proprietary to a single brand or model (and if they are, that doesn't last long; the industry is quick to 'copy' innovation!), there are two distinct 'classes' of receivers in the field:

- 1) Those that are 'IRD' compatible, and,
- 2) Those that are not.

IRD - *Integrated Receiver Descrambler* - is the customer addressable receiver descrambler unit. Sometimes called 'the brick' (because of its shape), the IRD remains a module separate from the receiver proper. For those services which are scrambled (encoded for reasons of security to force the payment of fees to view) the satellite receiver must have descrambling capability. Although the world has many 'scrambling systems,' and individual pieces of hardware created specifically for each system, most systems fall into one of two categories. There are scrambling systems that transmit all of the descrambling information and instructions within the TV signal (VideoCipher from General Instruments) and those that 'leave out' a key element of the scrambled puzzle solving and supply that 'key' in a plastic credit card like device (VideoCrypt). Most present-day North American systems use the VideoCipher technique while most European satellite operators use some variation of the VideoCrypt technology (as does our Sky TV here in New Zealand).

In both cases the actual descrambling circuitry is built in its own 'module' (IRD) and the module is typically added to the receiver by the satellite dealer at the time of system sale. IRDs, then, have their own OEM/distributor/dealer product flow chain separate from the receivers proper. Not all receivers have a (internal nesting) provision for a descrambling module.

While ideally a descrambler should be directly married into the receiver, this is not mandatory. Therefore it is possible to acquire a receiver with no provision for an internal descrambling module, and as required add an 'outboard descrambler' at a later date. With a warning. Quite rigid standards have been established for the marriage of a receiver and the descrambling module. When the receiver is designed to allow the module to simply 'slip in' to a 'nest' within the receiver, all of these technical standards have been met. When the descrambler 'tacks on' to the receiver as an

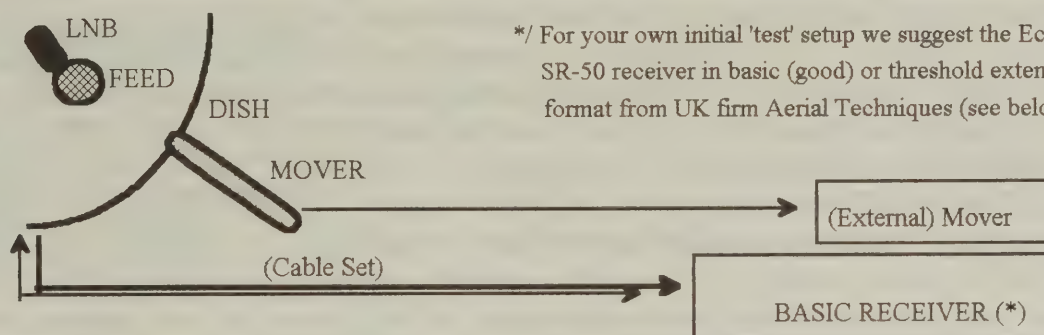


outboard unit, there can be major difficulties with consummating of the marriage. In the worst case, the marriage cannot succeed and the two will not work together. In the best case, there are interconnecting cables. In between these extremes are small adjustments (controls to be set) inside the receiver, or descrambling module and/or minor (dealer) parts modifications to the receiver.

This is not superfluous information as it is possible to locate some otherwise very high quality receivers that lack internal IRD/module capability for significant savings. In fact, the best (most sensitive, more user flexible) receivers are seldom those designed for consumer-friendly IRD/module compatibility. Some examples and recommendations are shown separately here.

Receiver pricing, then, falls in two categories; receivers which will accept an IRD/descrambler module, and those that will not. The majority of receivers intended for North American use are

CTD SUGGESTED 'STARTER' KIWI SYSTEM



C BAND: Dish/Orbitron-3.7m (SX-12) at US\$639/NZ\$1150(a, b). LNB/CalAmp Slimline30 degree at US\$99/NZ\$180(a,b). Feed Chaparral Polarotor at US\$59.95/NZ\$109 plus Dielectric plate (for Intelsat) at US\$15/NZ\$27 (a,c). Dish Mover/24" Von Weiss at US\$129/NZ\$235(a,c) plus Pansat AP3000e controller (230vac) at US\$189/NZ\$344 (a,b). Cable set/30m Direct Burial Ribbon for Polarotor, actuator + sensors, two incoming RG-6/U lines at US\$1.89 per m; US\$57/NZ\$103(a,b). Receiver/Echosphere SR-50 in standard form at UK 150/NZ\$470, threshold-extension form at UK 299/NZ\$940 (d). Price total less GST, transport: NZ\$2618 to \$3088.

Ku BAND: Dish/Paraclipse 6'(1.8m) Hydro at US\$299/NZ\$544(b). LNB/CalAmp KU 0.8 dB (*) at US\$108/NZ\$197(b). Feed Chaparral Ku band Polarotor at US\$59.95/NZ\$109(b). Dish mover, controller, cable, receiver see C band (above). Price total less GST, transport: \$2,002 to \$2,472.

a/ Before ordering offshore check with: Robin Colquhoun, 32 Valley Rd, Mt Eden, Auckland 3 (09-630-7127), and, Selwyn Cathcart, Telsat Communications Ltd, P.O. Box 1537, Palmerston North (06-356-2749), and, Brian Evans, Pacific Antennas, P.O. Box 265, Whangaparaoa (09-424-0841)

b/Skyvision, 1010 N. Frontier Dr., Fergus Falls, Mn. 56537 USA (001-218-739-5231); catalogue available.

c/DBS Satellite Television, 2316 Channel Dr., Ventura, Ca. 93003 USA (001-805-652-0255); catalogue.

d/Aerial Techniques, 11 Kent Rd., Parkstone, Poole, Dorset, BH12 2EH, UK (00-44-202-738232)

*/ BEFORE ordering Ku band LNB, decide between Intelsat (11.45-11.94), PanAmSat or Aussat sub-bands

ABOUT PROPER PRICING: Some readers familiar with existing TVRO system pricing in New Zealand will take exception to the prices quoted here. Prices reflect 'mail order discounts' and are lower than New Zealand pricing for identical units. See bottom, page 18 here for additional pricing discussion.

2/ Readers with a need to more completely review the technical parameters of a home or commercial TVRO installation should subscribe to our **Tech Bulletin** publication. July and October (1994) will deal extensively with all of the system segments as well as installation techniques. Tech Bulletin 1994 at \$60 subscription through CTD.

sold with IRD-module-nests in place. And until we have more precise information as to the method of scrambling to be used in the Pacific, importing these American-format receivers could be a mistake; you would be paying for an 'IRD' capability which you might never be able to use. Likewise, receivers designed with the VideoCrypt 'plastic authorisation card slot' might also be a mistake. In fact, in an analogue transmission world by not knowing the 'format' of scrambling to be employed (for New Zealand viewers) any significant investment in a particular 'descrambler compatible' receiver could be a gamble.

ANALOGUE vs. DIGITAL

Predicting the future employment of a new technology is a dangerous exercise. Digital is a new technology (CTD:9308, feature report) and with the launch of the first of two new all-digital-transmission satellites this month in North America (DirecTv) very significant investments are being made there in the digital revolution. At the same time in Europe new satellites scheduled for launch in 1995-96 are also planned as 'digital-transmission' satellites. We, however, receive now (and probably will in the near-future) the majority of our satellite TV via satellites covering the Pacific Ocean Region (POR), or, Asia. The progress of digital in these areas is less certain.

What is likely (here comes the dreaded prediction) is that we will have some combination of digital and analogue for perhaps five to seven years in the POR. This unfortunately means we may have to equip satellite viewers with both receiving formats for some period of time; analogue today because that is our operating 'format', digital add-on at some unspecified future date. Ultimately, we'll be all-digital along with the rest of the world.

For the time being you can imagine a digital receiver add-on much like you imagine a descrambler add-on; a separate box that plugs into the basic receiver; not unlike a 'standards' converter. Some North Americans are calling this add-on box a 'transcriber' but there is no world accepted terminology yet. With this visual in mind, the satellite receiver system looks like the diagram on page 10; a basic non-IRD/module receiver with the ability to be modified with add-on adapters to upgrade to (a) scrambled transmissions, and, (b) digital. All of this helps us focus on what type of satellite receiving systems are most likely to be sold in New Zealand from 1994 to perhaps 1997-99.

HOW FAR TO DIGITAL?

UK satellite hardware leader Pace Micro Electronics Technology points out that in 1960 1 meg of memory cost US\$1,000,000; by 1990 US\$40 and the forecast is US\$1 by 2000. The level of semiconductor integration doubles every 1.5 years and a doubling of unit volume reduces user prices 33%. Pace believes that by 1998 digital costs will be equal to comparable analogue costs; by 2000 digital will be cheaper than analogue today by a factor of 25%. Thus digital will first be used because it is a superior technology but ultimately it will be chosen because it will be cheaper.

THE NEW ZEALAND SYSTEM

Starting with the dish, the user/seller has the first decision:

Will the dish be C band only, or, C plus Ku band(s)?

If C band only, the next decision will be size. If C plus Ku, the same decision plus one more. A C band dish, if it uses a perforated mesh (metal with holes in it) reflector surface, may not be suitable for Ku band as well. The size (diameter) of the 'mesh holes' affects performance and holes that are fine at C band may be too large (allowing the dish to 'leak signals' through at the shorter Ku wavelengths). So any perforated metal dishes selected must be 'Ku mesh rated' if the dish is likely to be used (initially or at a later date) for the higher frequency band (Ku) reception.

Having made this decision, we move on to dish size. If all of the satellites projected to serve New Zealand were in place today, we would have field experience to guide our antenna 'size selection'. That is not the case and what we do have are 'predicted' signal levels (coverage contours). We illustrate antenna sizes versus satellite in graphs (pages 7 and 8) for C and Ku. In words:

C band: A range of sizes from 4.6m (15.4') down to 3.0m (9.8')

Ku band: A range of sizes from 3.7m (12.1') down to 0.5m (1.5')

What will the 'typical' consumer want from his/her satellite dish? A choice of new programming, certainly. For at least the first few years (1994 to perhaps 1997) our primary 'entertainment' satellites are likely to be (a) PanAmSat PAS-2 on C and possibly Ku band, (b) Palapa C-1 (on C band only), (c) AsiaSat 2 (on C band only), and, (d) possibly Intelsat 701 (C band most likely, Ku band possible). Does this help redefine the dish sizes? Unfortunately only slightly. On C band, a 3.7m (12.1') dish will be adequate for Palapa C1, borderline for Asiasat 2 or Intelsat 701 and marginal for PAS-2. On Ku band, a dish size 1.8m (5.9') or smaller will suffice for every service except the presently available 'spillover' from Aussat (Optus) A3.

And until a single satellite contains sufficient programming to be attractive to consumers, each installation will require a dish mover (i.e., motorised dish drive to repoint the antenna from satellite to satellite on command). Control for the dish mover is either built-into the receiver proper (virtually every IRD/module receiver has this built in because of the plurality of satellites in North America), or, it comes as a separate 'box' that fits atop the receiver proper (as is the case with many non-IRD or European scrambling format receivers). We investigate pricing for all of this on page 11.

Ultimately, it is likely a single satellite will contain sufficient channels of interest that lower cost, dedicated (to one satellite) receive packages can be offered at retail to consumers. And while this could happen at C band, it is more likely to be a Ku band package with a dish in the 1m (3.3') size range. When is 'ultimately'? Perhaps 1997; sooner only if the Australians get their act together and make 'reasonably priced' service on the high power New Zealand Beam available at Ku band. The pricing goal here is the 0.5m American DirecTv receiver system which including the new digital 150 channel receiver will retail for US\$700/NZ\$1200.

The 'dish' selected, with a dish mover, the receiver package is next. Most consumers view the dish plus the outdoor (dish feed) mounting LNB as a 'package' but in truth dealers are likely to source the two separately. A subset of this selection is the dish feed assembly.

If the dish will be used only with C, or Ku, the feed selected will be 'single band'. On the other hand, if the system will be used initially (or within the foreseeable future) on both C and Ku, a 'two-band-feed' (C + Ku) will be required. Here the Australian satellite presents a unique problem. Most of the world utilises a frequency range of 10.95 to 12.25 GHz (10,950 MHz to 12,250 MHz) for Ku transmissions. Not Australia; they use 12.25-12.75 GHz and both PanAmSat and Intelsat will be using the lower portion of Ku band. Australia's 'unusual choice' affects your selection of a feed antenna, and the LNB. Feeds designed for only the lower portion are to be avoided, as are feeds designed only for the upper (Australian) end of Ku. Buyers should be careful when selecting Ku feeds; they need to cover the full frequency range of 10.950 to 12.750 GHz. On page 11 here we suggest a 'test system' for your own use in learning more about the possible business possibilities of TVRO systems. The appropriate C + Ku feed for a two-band system would be the Chaparral Corotor II Plus at US\$259/NZ\$471. The LNB is a bigger problem since it is electronic and only works with specified input frequency ranges. No LNB exists which will function on both Intelsat and/or PanAmSat and Aussat/Optus portions. This unfortunately means a

Ku band dish equipped for all three will require at least a pair of LNBs; one for each frequency range (Ku bands are 10.95-11.7 GHz, 11.45-11.94 GHz (Intelsat-K), 11.7-12.25 GHz, and 12.25 - 12.75 GHz (Aussat). There are some technical problems to be worked out here before small Ku band dish systems capable of receiving at user selection Australia, or, Intelsat/PanAmSat are in the marketplace. If you had to do it today, the answer might be two separate dishes each with its own feed and LNB; not a good choice.

The indoor receiver can be (and should be by design) compatible with either C or Ku. We have already discussed the difference between American IRD/descrambler module ready receivers and those that are not; as well as the European decryption modules. And we have suggested that until we know more about the method of scrambling likely, receivers should not contain either function since you could be buying the wrong format. What you are looking for are receivers capable of mating with an external, separate, descrambler at some future date. Even here there is a bit of a gamble since different scrambling systems have slightly different interfacing requirements for external descrambler units. Here are the important points:

- 1) The receiver should have a '70 MHz IF Loop', a pair of connections on the back of the receiver typically marked '70 MHz out' and '70 MHz in' or between the two fittings '70 MHz loop.'

Fresh out of the box, the two connections will be joined with a short length of black (coaxial) cable.

It is into this 'loop line' that future descramblers, or digital 'transcribers' may be fitted.

- 2) The receiver should have an output jack marked 'composite out' or 'composite BB.'

For most external descrambler designs, you'll use one of these 'lines' to add a descrambler unit.

The receiver should also have:

- 3) A control that varies (tunes) the 'video (IF) bandwidth' of the incoming signal. Some receivers have a two to four position switch with switch-selected bandwidths. Others (i.e., SR-50) have a continuously variable control knob. Bandwidths as wide as 36 MHz, as narrow as 12 MHz are desirable as often the programme to be watched uses a customised bandwidth.

- 4) A tuneable audio frequency (subcarrier) control that allows the user to tune in the best quality audio signal. A tuning range of 4.5 to 8.0 MHz is generally adequate. A receiver with two positions (often marked 6.2 and 6.8) is not adequate.

- 5) A control that varies the audio bandwidth since different programme sources typically have different bandwidths. A range of 75 to 400 kHz is usually adequate.

Finally there is the matter of 'dish mover/actuator' powering and control. Most dish movers have low power 30-36vdc range motors built into a 'ram arm' that telescopes in and out by reversing the polarity of the dc voltage. Some receivers provide this voltage to a terminal strip, as well as a simple 'east' and 'west' front panel switch so the user can repoint the dish from his receiver. More consumer friendly receivers have microprocessor 'satellite location' memory functions built-in. The installer initially moves the dish from satellite to satellite, telling the receiver to 'memorise' the position (location) of each satellite. Once this has been set into memory, the consumer simply uses a keypad to select a satellite number or name and the dish moves to the proper location from the memory. The same functions are available in separate control boxes but if you can have it all built into the receiver, the better for the consumer-friendliness of the system.

Receivers start at the very basic (list price under NZ\$500) and go upward as features are added. Top end receivers have full infrared remote control, on-screen graphics/titling/instructions (with up to 12 selectable languages including Polish!), elaborate memories that can recall on keypad entry up to 350 different channels on up to 30 different satellites, outboard connections to drive external stereo, VCR, or decoders and internal memory timers that move the dish to a preselected satellite, the receiver to a preselected channel and start an external VCR on timer command. It is possible to spend more than NZ\$3,200 for the receiver alone.

CTD prices and sources what we consider to be a good value system adequate for 1994 use (and beyond) by the prospective dealer on page 11.

IS THERE A BUSINESS HERE?

Numbers time.

With a population of 3,500,000 and 3.2 persons per household, New Zealand has 1,093,750 households. TV1 claims to reach 99% of these homes (all but 10,938); TV2 98% (all but 21,875). TV3 claims to reach 93% (all but 76,563 homes).

Sky's present three-channel service with currently under way expansion will be available to approximately 75% of New Zealand homes (all but 273,448 homes). In the regions where Sky has been available for two years, it has a penetration of approximately 15.7%.

From this we can identify the 'class' of homes likely to be prospects for a home satellite dish. They would include:

a) 15.7% of those 273,448 homes Sky will not reach (or 42,931 homes), using the penetration for satellite TV systems as identical to the penetration for Sky where available;

b) Some smaller percentage of homes where Sky does reach but which elect satellite TV over Sky.

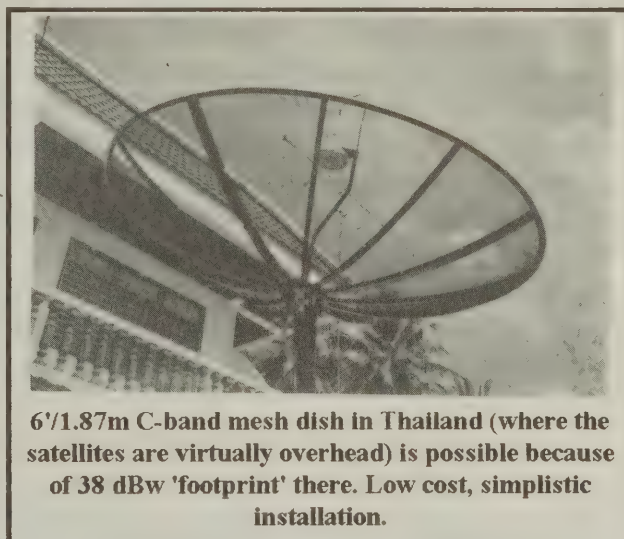
Within the 273,448 non-Sky-available homes are buried 76,563 homes which also do not receive TV3. These are true two-channel homes. Also within the non-Sky homes are 21,875 not receiving TV2 and 10,938 that do not receive any New Zealand TV. Logic suggests the no-TV-at-all homes, followed by the TV1-only, and TV1 + TV2 only homes will be more interested in satellite TV than homes in Auckland or Wellington.

So how big is the New Zealand satellite TV marketplace?

It is at least as big as the Sky market in areas Sky reaches (42,931 homes at 15.7% penetration). If, for example, Sky's present three channel service were placed on satellite and offered to homes they do not now reach for the same cost of installation and the same cost of monthly service, logic suggests 42,931 new Sky homes would sign up for the satellite delivered Sky service. Of course this is not practical when the satellite receiving system will cost the consumer upwards of \$3,300 if C band is utilised, or \$2,500 if at Ku. So there will be a reduction in the total number of homes taking satellite TV (versus terrestrial Sky if offered) because of the capital cost of the receiving equipment.

How much of a reduction? If the price of the receiving system comes down, how much bigger will the market become?

In New Zealand dollars, when the American satellite dish systems dropped from NZ\$13,500 to NZ\$4,500 the market grew from 1,000 systems per month to over 10,000 per month. When the price dropped further to NZ\$2,700, the market surged to more than 40,000 per month. In 1994, America's new Ku band DirecTv service will sell complete home systems for NZ\$1,200 and they



6'1.87m C-band mesh dish in Thailand (where the satellites are virtually overhead) is possible because of 38 dBw 'footprint' there. Low cost, simplistic installation.

SEGMENT	Retail/w/GST(*)	Dealer Cost	Dealer Net	Distributor Cost	Distributor Net
3.7m Antenna	\$1150	\$863	\$287	\$604	\$259
30 deg. LNB	\$ 180	\$135	\$ 45	\$ 95	\$ 40
Feed System	\$ 60	\$ 45	\$ 15	\$ 32	\$ 13
Actuator	\$ 235	\$176	\$ 59	\$124	\$ 52
Controller	\$ 344	\$258	\$ 86	\$181	\$ 77
Cable	\$ 103	\$ 77	\$ 26	\$ 54	\$ 23
Receiver	\$ 500	\$375	\$125	\$263	\$112
Install Labour	\$ 400	\$200	\$200		
Totals: Retail price \$2972 + *\$372 GST = \$3,344. Dealer net = \$643 in hardware mark-up + 200 (net) in install labour = \$843 (28.4% on \$2,972 or 39.6% on \$2,129 cost). Distributor net = \$576 on \$1,353 cost or 42.6% on cost. Ku band terminals have similar percentages but lower overall numbers (at \$2,232 consumer net + GST).					

are projecting a market in excess of 100,000 per month. How does New Zealand fit into this picture?

As described on page 11, if you go through current US and European mail-order-satellite system catalogues which typically sell for 20% below list price, we have 12 foot (3.7m) C band packages ready to install at NZ\$3,344 (including New Zealand GST but less transport). Or, 6 foot (1.8m) Ku band systems at \$2,002. A table (above) shows how this translates to distributor and dealer profit. Lower cost packages with fixed (smaller diameter) antennas are available from Australian Av-Comm (3); detailed in their new catalogue. At the dealer point the installation labour for a 3.7m dish should be approximately NZ\$400; a more than fair amount for the dealer who is also earning a mark-up on the equipment. At Ku, \$300 (reflecting the smaller, less complicated dish).

The study reveals that a dealer selling through a 3.7m C band system would profit to \$1,043 including his installation labour charge of \$400; for a Ku system, \$746 including \$300 installation. At the distributor level the C band system pass through earns \$576 while the Ku earns \$436. These could be considered worst-case numbers since nobody begins with the pricing in a US mail order catalogue to determine the New Zealand selling price in a real business venture. In practice, pricing at all levels (including consumer-user) could be as much as 10% or more lower than quoted here (shipping being a variable that increases costs in small shipment lots).

Consider now the 273,448 New Zealand homes beyond Sky reception at the existing 15.7% penetration level of Sky; or 42,931 homes. We'll ignore the entire balance of the country (1,050,819 homes) for the moment. And break those 42,931 prospect homes into a five year period selling equal numbers (8,586) home dish systems each year. With an installed price of \$3,344 (C band), our 8,586 home terminals per year becomes a \$28,711,584 annual business; \$143,557,920 in five years. For Ku the numbers are \$21,224,592 per year, \$106,122,960 in five years.

How much of a business are these numbers? Compare that a Sky TV base of 110,000 homes, each paying Sky \$40 per month, adds up to \$52,800,000 per year; C band sales of 8,586 per year

(3/ Australian supplier AV-COMM Pty Ltd. (P.O. Box 225, Balgowlah, NSW 2093: Tel 00-61-2-949-7417)

comes to 54.4% of Sky's example (annual) gross receipts.

Now consider that 8,586 home satellite terminals represents 0.785% of the total New Zealand homes; in five years 42,931 homes equals 3.93% of New Zealand homes; less than 4 percent. Remember that TV3, for comparison, acknowledges that 7% of New Zealand homes remain without TV3 service. Is it unrealistic to project 4% of New Zealand homes would own a satellite dish by 1999? We don't think so.

THE MONTHLY CASH FLOW

There are three classes of satellite TV programming in North America and Europe. Level 1 are *free to air services*, supported by advertising, by religious groups, by universities and others who have products (material or motivational) to sell. We are unlikely to have very many (if any) such services in the POR. Level 2 are services for which a *modest monthly charge* is made. Cable operators in North America, for example, pay less than 20 cents per subscribing home per month for CNN because CNN carries a reasonable amount of advertising. Via satellite, services such as CNN typically cost North American home dish viewers in the region of US\$5 per year. We can expect a few of this level service in New Zealand. Level 3 are totally paid for by *subscriptions*. Premium movies, Playboy and others charge home viewers in the region of US\$80 per year. All of this in terms of New Zealand dollars follows.

On the basis of 5 programme services (minimum) delivered via satellite, we will use the present Sky charge of \$40 per month as a benchmark. Our rationale is that if Sky viewers are agreeable to \$40 per month for CNN, ESPN/sports and movies, then home dish viewers should be willing to pay \$40 per month for five channels that includes a news channel, a sports channel, and at least one movie/premium service channel. Sky has managed to attract 110,000 subscribers in less than 3 years with this rate; could not a home dish service attract 42,931 subscribers at the same rate in five years?

By the end of year one 8,586 homes paying \$40 per month are spending \$4,121,280 per year. At the five year level 42,931 homes are paying \$20,606,800 per year. Why should this interest a fellow selling dishes?

Before a home satellite packaged service can begin in New Zealand, there will have to be a New Zealand firm that handles the marketing, distribution of the descrambler hardware, and collection of funds. On the assumption that our packaged satellite programming originates from offshore (such as Singapore), managing this business will fall to a New Zealand firm under contract to the programme suppliers. Industry fees for such a service run between 15 and 20% of gross take. At the \$20,606,800 level of annual receipts, this amounts to between \$3,091,032 and \$4,121,360. Yes, there is opportunity here for another brand new Kiwi business as well.

THE MULTIPLYING POWER OF SATELLITES

Finally, there is the fact that volume begets volume. Satellite television programming has from the outset (1979 in North America) been driven by programming availability. From the meagre 1976 start of HBO's first 8 hour per day movie channel, by 1993 the industry had grown to more than 330 separate programmers operating typically 24 hours per day.

Palapa C1 service (up to 12 possible channels; second half of 1995), and Asiasat 2 service (up to 24 channels, first half 1995) require no New Zealand home dish subscribers to survive. Both Asiasat and Palapa already have programmers in place (more than 30 programmers between the two) serving Asia from their present generation satellites. Their new satellites have been designed to add New Zealand to the existing coverage at very minimal additional cost. Both satellites will be

up there with programmes whether New Zealand provides 1 subscriber or 100,000 because Asia is their real market. Neither satellite is depending upon New Zealand for customers to exist: we are simply an extra area they have chosen to serve because we are here and nobody else is bothering to serve us. This is all quite independent of anything Australia might do; quite independent of programmers appearing on PanAmSat or Intelsat. This is bringing New Zealand television viewers into the world of British Sky, Asian MTV, Chinese movie channels and a host of other specialised programme services through Asia's back door.

Asia is the world's most rapidly developing area. Economic growth in Korea, Taiwan and Thailand (to name but three) is in the near-double digit region. Just as America and Europe both now have more than 18 Palapa-Asiasat-PanAmSat class satellites functioning with more on the way, Asia's present satellite population (functional and coming) is projected by 2000 to grow to similar numbers. And each of these new satellites will provide new opportunities for additional programming into New Zealand.

We'll revisit this subject again in midyear of 1994; for now, the 'second coming of satellites' to New Zealand is looking pretty exciting!

For those requiring more technically oriented material, try **Dick Smith Electronics** for the soft-cover 'The World of Satellite TV' by *Mark Long & Jeffrey Keating*. This special 'Satellites For Asia' edition, while somewhat dated with information concerning satellites, provides a good schooling in the basics of home dish system design.

Bryon Evans (Pacific Antennas, P.O. Box 265, Whangaparaoa; FAX 09-424-0841) has created a very clever answer for converting ground/roof stationary AFRTS-style large dishes (typically 6m and up) to allow them to 'track' the inclined orbit Intelsats described in **CTD: 9311**. Normally, to track the satellite, you must physically move the dish (up and down) to repoint at the satellite's (moving) location. Evans researched leaving the dish stationary but moving the feed. This has the effect of changing the direction the dish points without actually moving the dish proper, at far lower cost than rebuilding the dish so it can move. Within limits the same principal can be employed to allow an earth-stationary dish to receive two or more adjacent-in-orbit (say located between the range of 174 and 180 degrees east) satellites. So don't write-off the old 'clunker antennas' just yet; they could turn out to be useful without major modification in the future. Full details from Evans.

Singapore has two world-class satellite hardware distributors maintaining good stocks of equipment (although not necessarily the specific units suggested by **CTD** here on page 11). **Tee-Comm Electronics, Inc.** (Art Goldstein) through **Exactel Communications Pte. Ltd.**, 315 Outram Rd., #15-05 Tan Boon List Bldg., Singapore 0316 (FAX: 00-65-227-7335); **Echosphere Corporation** (Bert Klein), 16A Science Park Drive, #04-03 The Pascal, Singapore 0511 (FAX: 00-65-779-6051).

Equipment pricing is confusing and controversial when 'discount mail order' catalogues blur the distinction between retail buyer/dealer. One example. The Orbitron model SX-12 antenna, recommended here earlier, has a 'catalogue price' of US\$639. Its quantity 1-5 'dealer price' is US\$525 dropping to US\$489 at 99 pieces and further to US\$449 for 100+. The pricing differential between the discount catalogue and 100+ is in the range of 42% on \$449 cost. To date New Zealand dealers with very low annual volumes have typically bought in the 1-10 discount region.

PUBLICATION DEADLINE - POSTSCRIPT

Sources at Television New Zealand report Intelsat 508 at 180 degrees will not be replaced until March 1996 according to their most recent Intelsat advisory; 508 which carries most of Intelsat's present TV had originally been scheduled for replacement in June 94. Intelsat 701 (new at 174 east) is labeled 'Major Pacific' and it, in replacing aging 510 (**CTD 9311**: page 11) will, TVNZ forecasts, probably not handle much video, being dedicated primarily to telephone traffic. Should this be correct, hopes for improved video signals via 701 are dashed for the time being and new, stronger video signals will therefore await the launch of PanAmSat PAS-2 in May with a 169 east orbit spot turn-on around 01 July. Separately, Television New Zealand in February will begin taking compressed digital video feeds from BBC London using the (UK) NTL (proprietary) compression package in MPEG-1(plus) format via a two satellite (57E and 180) routing. TVNZ anticipates no increase in the amount of UK material initially taken with this upgrade to CDV and the daily analogue feeds from London to TVNZ will cease.

TECHNOLOGY

BYTES

...BITS AND BYTES YOU MAY HAVE MISSED IN THE RUSH TO MAKE A BUCK ...

SATELLITE TV

CNN, available via satellite (180 degrees east) and through Sky (UHF) TV in New Zealand, has begun an extensive (CNNTText) teletext service throughout Europe; with plans to expand around world. Service is available to any teletext equipped television set without surcharge. Basic service includes world news, programme and hotel guide, weather and travel information, sports scores and business information. Like other teletext services, it is carried in vertical blanking interval (VBI). In addition to this no-charge service, Reuters is offering a pay data service in the same VBI. This one initially has approximately 90 pages of financial news and can be interfaced with optionally available 'hyperCom' card that interconnects with personal computer for display. CNN plans to expand service in middle east (via Arabsat) next, then into Asia. When Pacific Ocean Region (POR) satellite feed will have service has not been announced. Unless Sky takes steps to remove it from feed, it should 'flow through' terrestrial network to Sky customer TV sets in New Zealand.

Australian 'TAB-like' Sky television service has been quietly exploring possible expansion into New Zealand via Aussat/Optus satellite. Tests were conducted in New Zealand over weekend of November 20-21 of the available Optus B1 transponder 6 satellite signal and engineering studies are now being reviewed to determine the reception system dish sizes and receiver requirements. Transponder 6 is one of Australian channels that can be directed simultaneously towards Australia ('national beam') as well as New Zealand on 'side-squirt' spot beam. Those running tests (at least as far south as Westport on South Island, Auckland area North Island) found Sky video used during tests at or above threshold (perfect pictures) on dishes down to 1.6m in size. On paper if Optus ran full 50 watts to New Zealand spot beam perfect reception would extend down to 0.5m antennas. Optus was not saying what purpose of tests was but some believe pending announcement from New Zealand TAB/Action TV terrestrial channel will clarify possible use of Optus for at least one transponder feeding into New Zealand. Sky in Australia denied any involvement in testing, suggested their signal was chosen for tests only because 'it was handy.' In July Sky Channel (a wholly owned subsidiary of Nine Television) tested live broadcasting of horse racing using Intelsat at 180. At that time they advised **CTD**, *"It is our intention to begin broadcasting a package of Australian Thoroughbred Racing comprised of two meetings per day, six days per week."* Eventually the service would grow to five meetings per day. Race meetings covered will include Metropolitan (Randwick, Rosehill, Caulfield, Flemington and Eagle Farm), Provincial (Newcastle, Gosford and Hawkesbury) and Country (Tamworth, Couburn, Grafton, Port Macquarie) venues. Contact is Peter Hawkins, Marketing Manager/International Racing, Sky Channel, 2/81 Frenchs Forest Road, Frenchs Forest NSW 2096 (FAX 00-61-2-452-4540).

'Five Nations Rugby Matches', January, could be partially or totally available on contract to private bars and pubs in New Zealand, via satellite, unless Sky or TVNZ buys package of matches. International Satellite Communications, Inc. is handling the package and arranging sales/feeds; call (USA) 001-516-931-2925.

French objection to launch of American based Turner Network Television and Cartoon Channel because neither carried 50% or better European content has been struck down in Belgium. Little noticed at time of French objection was Belgium government ruling preventing cable system Coditel Brabant from carrying service. Action was based upon Belgium interpretation of European Community 'rule' governing satellite TV programming. Belgium

SATELLITE SERVICES NUMBERS

CTD routinely provides telephone (or more often FAX) 'telephone' contact numbers for satellite service firms mentioned in reports. An error crept into our listing for PanAmSat (page 12) in **CTD 9311** for which we apologise.

The full set of **fax** numbers relevant including the correct PanAmSat number follow: Intelsat Marketing 001-202-844-7925 (Larry Valenciano); PanAmSat 001-203-622-9163 (Cynthia Vanneck); Rimsat 001-219-484-4547.

PERSPECTIVE: Chinese/Asian Clamp Down On Foreign TV

It began in India; minority members of the coalition government questioned the wisdom of allowing, without regulation, the importation of 'foreign cultures' television programming. With European, Middle Eastern and Asian satellites all 'visible' in some portions of India, the sky was suddenly filled with foreign tongues delivering unsettling messages. India in particular was sensitive about BBC World Service television news reports (often with footage of Indian events). The BBC reports, as with the shortwave radio reports of prior decades, often provide a different perspective of events within India than the government's official TV. Film/tape footage of police crackdowns on religious unrest was especially upsetting and with camcorders now as small as a paperback book and tape cartridges half the size of a pack of cigarettes footage is readily available from unofficial sources. India introduced legislation in their Congress in July to correct this situation; the coalition government sent it to committee where the would-be law now languishes.

Quatar was next. It said uncensored movies showing on-screen romance and less than fully clad bodies was contrary to locally strong religious practices. It banned private satellite dishes and insisted that people connect instead to the local (government owned) cable service, which routinely censors all material transmitted.

Malaysia and Thailand spoke up. They found 'violence, sex and nudity' inappropriate and asked that world-class satellite broadcasters 'establish voluntary controls to prevent such programming from leaking into countries where it was not welcome.' Korea added its voice to the rising chorus by warning that sending satellite broadcasts across borders might intensify racial or religious conflicts. When Rupert Murdoch purchased controlling interest in Asiasat, a primary source of television programming throughout Asia, several national leaders including Malaysian Prime Minister Mahathir Mohamad voiced their concern that his 'disregard for responsible journalistic practices' might allow the spreading of false or manipulated information; a tool, they worried, to unsettle established political rulers in countries of Asia.

On October 8th China closed down all importation of satellite television equipment with a brief announcement:

"Any importation or sale of equipment capable of receiving satellite television broadcasts from non-Chinese satellites must have approval in advance from appropriate government officials."

The fine print was even more sweeping. Chinese defence factories had converted to building home satellite dishes; state stores were selling home dishes; 4.8 million Chinese homes are connected to satellite TV. Existing dishes have until April to 'register.' By any standard, they were 'cheap' to buy: NZ\$426 for a complete Chinese-built system; imported dishes cost more although Taiwanese built dish systems sold well at the state owned 'Friendship Store.' Failure to comply with the new rules could hurt: fines of NZ\$550 for individuals, NZ\$5500 for housing co-operatives. Only people living where terrestrial TV is not available, or those engaged in the manufacture of home dish systems (China exports approximately 30% of the world's universe of home dish receivers) will escape licensing requirements.

Unofficially, Chinese officials tagged three satellite services as unfriendly to 'Chinese political ideology': CNN and BBC World Service; no surprise there. And ... **MTV**, Music Television. For CNN, it was a slap in the face having just announced a new full-time news bureau in Hong Kong. For the BBC, it was the 'same old story'; when you show news events in a way that political leaders consider unfriendly, there will be retaliation. For MTV, it was a new experience.

'MTV Kids' are a relatively new phenomenon. Teenagers, young adults, who become so immersed in the pop culture rampant on the music channel that they dress, talk, and emulate their pop idols. An 'MTV Kid' is not the model of communist Chinese ideology. An MTV kid shuns work, behaves in the mould of the American or British pop star, talks the slang that elders quickly learn to hate. Chinese teenage girls emulating Madonna sent Chinese political officials into their own near-earth orbit. Guns N' Roses would never be invited to perform atop the Great Wall of China.

MTV, ESPN, Discovery Channel, CNN and other American video staples are now world-wide. Murdoch's BSKyB channels are on the move, already in Asia, and headed our way. Before the announced Chinese ban, Murdoch had released his plan to expand Mandarin language TV, even to add Mandarin pay channels. And not all governments in the satellite coverage zone appreciate the spread of western (video) culture.

Commerce Court subsequently ruled EC directive as applied in Belgium was improperly handled allowing Coditel to put two Turner services back on cable there October 27th.

UK (government) has warned foreign based satellite television programmers not to beam pornographic programming into country. Britain has banned Red Hot Dutch (Dutch originated) X rated channel decoders from sale in country (although that has hardly stopped programme distribution in UK) and has warned a new channel described as "live transvestite sex shows" it will not tolerate distribution there.

Murdoch's BSkyB profitability (CTD 9311; page 19) has been analysed by consultants Booze Allen who project that by 1996 satellite network will have greater total profitability than UK terrestrial ITV network. Cable operators in Europe are not pleased with BSkyB charges per month. They claim the NZ\$0.82 per cable home they now pay for each of BSkyB's channels is unfair against typical DTH (direct to home) private dish charge of NZ\$0.46. BSkyB is believed to now reach 2.5 million UK homes via DTH versus 500,000 via cable. With 21.6 million UK homes, BSkyB reaches 14.1% and is growing at rate of nearly 60,000 per month. BSkyB programme channels presently include 2 Sky channels, UK Gold (reruns of older UK programmes), UK Living, Bravo, Children's Channel, Country Music TV, Discovery, Nickelodeon, QVC (shopping), MTV and Family Channel with two new services (Nick At Nite and VH1 -music videos for 30-somethings) to be added in January.

BSkyB has declared 'war' on all hackers and pirates in Europe after obtaining injunction that stops major UK pirate card supplier Satellite Decoder Systems from selling, advertising or importing piracy hardware pending outcome of trial. While only UK and France presently have any form of anti-piracy legislation on books, BSkyB hopes to get civil actions against suppliers in other countries based upon theft provisions of individual country laws. BSkyB will pursue criminal as well as civil penalties against UK pirates.

Japan is creating its own unique form of digital television broadcasting and uncharacteristically not saying much about it. The 21 GHz (called 'Ka'; not a standard satellite band) downlinks will be 100 MHz wide per transponder (most unusual) and they plan 'after 2000' launch.

EBU digital compression video begins regular service in the first quarter of 1994 and already equipped for it are the former Soviet enclaves of (the) Ukraine, Belarus, Slovenija and Moldavia. Scientific-Atlanta won the contract for new 9 to 13 metre terminals which are gateways into and out of each 'country' with the European Bank for Reconstruction and Development picking up the tab for the system.

Two Argentina Intelsat delivered national cable programme services have signed with General Instruments to use DigiCipher digital compression system. South American cable feeds via Intelsat and PanAmSat now more than 50% converted to digital mode.

Comsat, operational arm for most Intelsat satellites, is developing new software/hardware technology called 'Bandwidth On Demand' (BOD) for digital transmission. BOD will be put into service in Europe plus Asia-Pacific in 1994. Intelsat now approaching satellite transponders (typically 36 MHz wide) in new way; users will be assigned space from available 'pool' of all transponders without regard to specific transponders. Casual satellite 'viewers' will find programming more difficult to 'follow' in future.

Home satellite system sales interest has grown 40% in last 90 days in USA; result of complicated new set of FCC rules that have created serious public relations problems for US cable industry. Cable customers, 'mad as hell,' are taking their orders to neighbourhood satellite dealer in such quantity that virtually entire American satellite industry has run out of stock, especially in electronics. If the 'anger' persists through mid-94, the new 150 channel DirecTV planning service to 0.5m dishes could be major benefactor. With complete home systems to sell for US\$700, there could be block long queues to buy dishes and kick out cable.

Toshiba has announced a new Ku band (12 GHz) signal amplifier stage which will make possible use of even smaller dishes for home satellite terminals. The rule of thumb has always been that if you use a 'lower noise figure' LNB (antenna mounted low noise down converter) you can trade-down to a smaller size dish and still experience quality reception. Toshiba is now in production with a 0.45 dB noise figure (30 degrees Kelvin) HEMT (high electron-mobility transistor) device that could result in Ku band dish size requirements in any situation being reduced by 20%. Or, dish owners with presently degraded pictures on weaker channels will find better (if not perfect) pictures by substituting the new Toshiba unit. Toshiba's new transistor design is quite radical and will also have applications to C-band satellites as well as higher frequency services such as the experimental CellularVision (27-29 GHz).

Philips has reduced to a new-minimum the internal parts required to build a satellite receiver. With just four (Philips proprietary) chips, satellite signals arriving at the receiver from the LNB (outdoor amplifier/converter unit) in the 960 to 2050 MHz range end up as video and audio. The IC (integrated circuit) chips are (a) mixer/oscillator with a

fully balanced mixer plus oscillator in the up to 2530 MHz range producing a second IF signal at 480 MHz, **(b)** gain controlled IF amplifier (IC) (480 MHz range) with dual outputs fed through SAW filters for multistandard TV signals and more than 50 dB of gain control range, **(c)** FM demodulator (IC) with emphasis on linearity and including AGC, AFC and carrier detection functions in the same chip, and, **(d)** frequency synthesiser to drive the transponder/channel selection tuner system with adjustments in 125 kHz increments. Costs and unit size will be lower than standard design approaches when using the new Philips IC units.

Five major distributors have been appointed by Thomson Consumer Electronics to handle new Ku band 150 (TV) channel DBS receiving packages when service launches in USA after April 1994. The five include Echosphere Corp., major US and European equipment distributor with Pacific region offices in Singapore (Bert Klein, 16A Science Park Drive, #04-03 The Pascal, Singapore 0511; FAX 65-779-6051). DirecTv 'count down' to opening of DBS system as early as April attracting major media interest. Prime supplier Thomson Consumer Electronics recently increased order with digital encoder supplier Compression Labs to US\$10.8M from earlier \$5M reflecting stepped up plans to add additional programming services to package. First bird (DBS-1) scheduled for launch as you read this; second bird (DBS-2) plans April launch into space. Production of digital DBS receivers through Thomson subcontractor Channel Master (North Carolina) began in November; SGS-Thomson began delivering its version of MPEG-2 decoder chips earlier this month (December).

Hughes will build Astra 1F twenty transponder high power digital-TV intended satellite for Europe. Satellite with Ku service from 19.2 east will serve home dishes down to 0.4m in size by 1996.

Sony's licensing agreement to provide digital satellite systems (Ku band) receiving systems to American DirecTv marketplace is considered major coup for firm. Thomson Electronics is supplying the initial receivers which it has designed and licensed Sony to join it in producing units for field after either 18 months or 1,000,000th receiver; whichever comes first. The Thomson packages will have a US\$700/NZ\$1200 range price retail including satellite dish and decoder system. DirecTv will use 11 of the initial transponders, Hubbard Broadcasting 5 more which with digital compression will amount to more than 75 separate programming services.

DirecTv has signed an agreement to distribute narrow-casting of Physicians TV Network to health care professionals over DBS service. More than 100,000 doctors and other health care personnel, 1,100 hospitals will be equipped with DBS systems for the service which will utilise a minuscule portion of the digital bandwidth available on the DBS satellites.

Asian countries 'officially closed' for the importation and use of home satellite systems include Myanmar/Burma, Cambodia, Malaysia and China although there are believed to be 'thousands' of 'pirate dishes' in Malaysia. Singapore permits dishes but only after formal government approval which is seldom given except to non-Singaporeans. China's October 8th issued 'closure' already seems to be 'leaking like a sieve'. One exporter told **CTD** *"We simply call the equipment something other than satellite receiving and our importer slips the Chinese official checking the paperwork and shipment US\$20 ... and it goes right through."*

Sri Lanka may not officially be opposed to the importing of satellite equipment or programming, but a government sanctioned terrestrial microwave network makes it virtually impossible for satellite systems within 50km of capital Colombo to operate on the incoming channels of two prime services. There are two point to point microwave C band links between Colombo and a coastal city to the south-west and by the oddest of coincidences these links have chosen to operate on the precise frequencies used by CNN and BBC World Service TV, effectively preventing many Sri Lankans from following these two news channels.

Greece (population 9,990,000) will spend NZ\$546,000,000 over next three years to design, build and launch satellite system that will provide communications relay within country as well as reaching major parts of Africa and Asia.

Thailand (population 54,536,000) launches the first of its two (domestic) C+Ku band satellites this month. Late in October Thailand and the operator of (1995) new Asiasat 2 (satellite) reached an agreement on conflicting orbital locations. Both Thaicom and Asiasat 2 had planned to park their satellites near 101 degrees east. Under the accord, Thaicom 1 and 2 will both go to 78.5 east (well beyond New Zealand view) where using opposite polarisation each

ARTHUR C. CLARKE AVAILABLE: *"How The World Was One"*, a Clarke history of the development of communication technologies from the earliest visual telegraph to the present time, has been released in New Zealand. Priced at NZ\$24.95 the publisher is Victor Galancz and "One" should be available at your favourite book shoppe; recommended for a good Christmas vacation read (especially chapter 35).

will provide C and Ku band coverage into Thailand, most of China and beyond to Korea. Thaicom (1) will provide up to 30 transponders for C band and 4 for Ku band allowing reach of the country's five operating TV networks to reach every home in the country directly. Thailand has an extensive network of overlapping terrestrial VHF transmitters which are subject to frequent and massive amounts of interference from each other and neighbouring country stations. Additionally, Thai cable operators will use the satellite to relay additional programme channels throughout the country.

Satcom Asia '94 will be held October 22-24 at Empress Hotel and Convention Centre in Chiang Mai, (northern) Thailand. First show, Phuket, Thailand October this year attracted approximately 200 attendees from throughout SE Asia providing springboard for launch this month of Thailand's first domestic satellite; up to 500 expected in 1994. Show features extensive hands-on teaching sessions for newcomers to world of satellite TV concentrating on basics of typical receive site installations. Details from Mark Long Enterprises at (FAX) 001-305-767-6067.

DIGITAL TV

European Launching Group for Digital Video Broadcasting, charged with developing game plan for introduction of digital video in cable, satellite and terrestrial fields, has closed down. Superseding ELG/DVB is new 85 member organisation including broadcasters, cable firms, telecasters, governments and TV set manufacturers. Each member is paying NZ\$24,000 per year to participate in development of firm 'launch schedule' for DVB. The new organisation is to implement the study plans evolving from ELG/DVB and a schedule has been announced. They expect to agree on standards for satellite and cable by the end of this year and to agree on transmission standards for terrestrial TV by the last quarter of 1995. Concurrently, determining final standards for reception equipment and the maintaining of links with Japanese and North American standards committees will be underway. The new group, presently calling itself 'The DVB Project', will build upon the now world accepted MPEG-2 video standard. The audio standard is less certain pending a final decision from North America where a Dolby variant was initially selected in November. MPEG-2 audio is based on the Philips Musicam standard. In the transmission area, like their North American counterparts, the choices seem to be coming down to QPSK (Quadrature phase-shift keying which is favoured by the satellite broadcasters), 16 or 64 QAM (quadrature amplitude modulation which is favoured for cable) and coded orthogonal frequency division multiplexing (which is favoured for terrestrial TV).

UK ITC has completed first phase of testing of digital TV transmissions built around (UK) PAL-G channels 35 and 37 where initial digital TV broadcasting may start. Channels have been considered 'taboo' for terrestrial use because VCRs in UK commonly output to TV sets here. Any analogue use of these channels ran into forecasts that from 50-75% of all sets in major metropolitan areas would not be able to receive stations broadcasting on these channels because of VCR co-channel interference. Digital, however, is far less prone to interference and in many instances it will totally ignore an analogue signal even on the same channel, basically 'slicing through' the even stronger analogue signal. ITC study says this has been found to be true, but they caution there can still be some loss of potential bandwidth for digital especially around the video and audio carrier frequencies of the VCR units. It had been hoped digital could slide into channels 35/37 without regard to the analogue VCR outputs. Study suggests that in most areas, channels 35/37 can provide room for between 4 and 5 new digital programme services; they had hoped for up to 8.

US approval of MPEG-2 video and Dolby AC-3 audio standard for HDTV (et al) is a 'win some/lose some' decision. Primary loser was Philips who had hoped their Musicam audio format would be chosen. Musicam was serious contender but failed mid-93 test when software routine built into demonstration system developed glitch and contaminated purity of test results. Philips may have another shot at decision and would probably settle for "Dolby AC-3 or Musicam" ruling. Primary 'extra' advantage to Musicam is that it is 'backwards compatible' with older MPEG-1 format; Dolby is not. In the video area, decision to allow 5 discrete progressive scanning speeds/line counts,

American schedule for introduction of widescreen/HDTV becoming clearer. ABC announced to its affiliates, via satellite, FCC will require all TV stations to be equipped for network originated 'digital pass through' to station provided digital transmitter by 2002 and 'first stations' would have digital transmitters and network interfacing in place in time for 1996 Olympics. FCC is working on new allocations plan to allow digital simulcasting using holes in present analogue allocations table. By 2008 FCC will 'take back' VHF analogue TV channels for reassignment to non-TV services. Survey conducted by Japanese NHK network of Americans showed 80% were already aware of HDTV, 60% said they would buy HDTV receivers if pictures were better, bigger.

or, 1,080 line interlaced scanning was in recognition that flexibility in selected (transmission) formats may actually be to consumer advantage. The extra cost for transmission selectable lines/scanning is believed to be less than 5% for receivers to be built. Progressive scanning better suits computer format users while interlaced scanning suits broadcasters. By adopting both, individual receivers/monitors will have ability to play at choice between virtually any digital video format likely for several decades without regard to the use or user. With 1,080 lines individual 'pixels'

PERSPECTIVE: Japanese Suppliers Tighten Belts

Japan's leading business paper, 'The Nikkei Weekly', headlined:

"For Electronics Firms, More Shocks Ahead"

During the 1980s Japanese electronic firms grew at an annual rate of 9.2%. So far in the 90s, growth has been averaging 0.4% per year and 1993 may actually see growth turn to decline. The slump has been evident for nearly three years but most Japanese firms really believed it was a short cyclical event that would self correct. And it's not just overseas sales that are down; domestic sales are down as much or more, category for category. How bad are finances? The most optimistic forecast reported in Nikkei Weekly's analysis was from one company (NEC) that thought business *might* turn around as soon as the last half of 1994. Other's forecast 1995, even 1996. NEC cautioned the hoped-for end of '94 turn around would depend upon a 'hot summer' which NEC says would hype domestic air conditioner sales. You probably didn't know they made air conditioners. You do know they make computers; and, across the board because of heavy competition from the likes of Compaq, NEC computer prices have dropped 50% (!) in 12 months in the Japanese domestic market. This is not solely an 'electronic' problem; 635 Japanese companies making up 94.9 of all firms listed on Japan's 'A Grade' stock market saw sales drop an average of 6.9% during the first six months of the current year while profits shot down 23%. Of Japan's 100 largest firms, 57 are cutting back employees and JVC is pressuring any management employee 50 and older to 'take early retirement.' One Nikko Research study warns Japan may have to lay off 2.35 million employees before the economy turns around. In a country where employment is considered 'lifelong' and one's employer considered 'father' all of this is sending shock waves through the national psyche.

Japanese firms typically operate on March 31 fiscal year ends so September 30 (six month) reports are recently out. Hitachi: consumer electronics down 6% (overseas 7%) and net profit down 15%. Matsushita: sales down 6%, profit down 36%. Mitsubishi: consumer sales down 14%, net profits off 23%; Sharp: sales down 4.3%, net income down 13.2%. Toshiba: consumer electronic sales down 12.0%, pre-tax profits down 4.8%.

Then there are the not-so benchmark but still meaningful indicators. The October Japanese Electronics Show, one of the world's largest, saw attendance down 6% and exhibitor participants down 17%. Or note the buried-in-the-back of financial page notes. Here's one that defies optimism:

"Mitsubishi plans to end exports of consumer products from Japanese plants, shifting production of all consumer electronics to overseas plants." And that includes all but the top-end (S-VHS) VCR decks.

Sony has opened a new picture tube plant ... in Pennsylvania where projection TV tubes will be made. They were formerly made in Japan. During August and September, for the first months ever, the US imported more VCRs from Korea than Japan. And in August Japan imported more TV sets than it exported. Japan importing TV sets???

Korea's Samsung and Goldstar have in the last 18 months become product innovators, developing new hardware techniques which just five years ago we would have expected from Japan. The Japanese analysts are reluctantly writing off HDTV for several years; they had hoped it would refire the consumer electronics industry and now that it is delayed beyond the schedule they hoped, analysts who were counting on HDTV to start the gravy train rolling again see nothing new coming Japan's way.

It's the little things. A Nikkei Weekly survey says the next university class (1994) may have tough times finding positions; this has never happened before. By company, the big names in electronics have forecast how many graduates they will hire from the class of '94 (with comparisons to '93). The numbers are not good for the students: Matsushita 850 (-29.2%), Mitsubishi 800 (-39.3%), NEC 850 (-29.1%), Sony 400 (-45.9%) and Toshiba 950 (-24%). The 100 largest employers in Japan say they will hire 36% fewer graduates in 1994 than in 1993. Japan is in transition ... **and it hurts.**

PERSPECTIVE: *Digital Satellite Hardware Progress*

Three years after the 'swing to digital' began, an analysis of the progress for key hardware parts that will make this revolution real. In 1992 two early players (General Instruments/GI, and, Compression Lab Inc./CLI) brought to market proprietary digital encoders (transmission end) and decoders (receiving end). Each made various superiority claims, each sold product to early satellite link operators. Neither is compatible with the 1993 MPEG-2 adopted 'world standard' for compressed digital video. In early 1993 Scientific-Atlanta introduced a third proprietary system which satellite operator PanAmSat (scheduled into the Pacific mid '94) promptly bought for delivery of programming to 500 South American cable TV headends.

Interoperability is the key buzzword; it means any piece of equipment, regardless of manufacture, can transmit to or receive from any other piece of equipment regardless of brand or model. MPEG-2 adoption cleared the way for this to happen.

But there is MPEG-2, and, MPEG-2 'with B frames'. The later is touted as better because it allows each picture frame to 'look ahead' five to six frames forecasting what the picture will look like. This results in improved picture efficiency, more pixels per displayed image. GI's DigiCipher has now partnered with AT&T and the 1994 'phase two' DigiCipher will be MPEG-2 compatible but not 'with B-frames'. Major US cable operators have placed orders for more than 2,000,000 of the new DigiCipher design in-home cable set-top converters. The cost to the cable operators is expected to be near NZ\$550 per home converter. American public network PBS will also use the new '94-version DigiCipher system at more than 200 member stations fed via satellite. So too will American premium movie networker HBO, compressing 8 separate movie feeds into a single 36 MHz wide satellite transponder. DirecTV, the 150 channel digital service launching in April in North America, will use a Thomson Consumer Products created system but the degree of MPEG-2 compatibility has not been announced. The complete digital DBS home system price will be NZ\$1200.

A number of suppliers (including AT&T) have begun delivering MPEG-2 'chips', each replacing hundreds of discrete transistors and ICs now required but MPEG-2 'with B-frames' chips today costs NZ\$54 more than without B-frames. By 1998 the industry projects MPEG-2 will cost no more than analogue; by 2000 25% less.

PERSPECTIVE: *Olympic Driven HDTV Schedule*

While uncertainty surrounds the exact date for implementation of digital television (with widescreen, HDTV protocols) in most portions of the world, the four-year spaced Olympic games are providing specific target points for at least the staging of the new technology. The 1996 Olympics, to be held in Atlanta (Georgia), is an 'early date' which at least some are hoping will correspond with the first major use of the new technology. Those less certain are suggesting the Sydney games in 2000 as a 'doable target'.

American network NBC has won the telecasting rights to the Atlanta games; Sydney rights have not been decided. The host telecaster helps determine format and NBC has made no official announcement. But major consumer electronics supplier Zenith (25% of US home TV market) has begun a public relations exercise clearly designed to pump up public enthusiasm for HDTV by 1996. Zenith of course would like nothing better than to have America's adrenaline pumping for HDTV because Zenith hopes to sell a significant share of the new sets.

As for 2000, Australia has yet to accept that digital television is coming; in any terrestrial form. Unlike the UK, the US, Japan and many European countries where digital introduction has moved through a succession of evaluation committees towards the setting of hard analogue-digital conversion dates ... the Australian television industry is still pondering what format might be best. MPEG-2 is seldom mentioned in their trade press, except as it relates to studio production equipment and possible use for Optus satellite transmissions.

In fairness, the malingering depressed state of the Australian economy has cut severely into TV capital expansion plans. A study suggesting between 45 and 50 HDTV outside broadcast vans will be required for Sydney coverage frightens them; who will pay for this new-tech equipment? But HDTV played a major part in Australia beating out China for the 2000 games with a strong pitch promising HDTV coverage of all events. Now they have to deliver on that promise even if Australia's terrestrial broadcasters could still be pumping out 'low definition' 4:3 pictures to their countrymen while the rest of the world watches Sydney in HDTV.

(picture dots) become 'square' when screen has 1,920 vertical lines. Square pixels make screens identical to future screens for computers, effecting considerable same-technology/same-hardware scenario. This is likely to end specialised market for computer monitors, for example, since any display system will be compatible with any source. The MPEG compressed digital video 'platform' will make the exchange of programming world-wide feasible and local 'standards' (NTSC, PAL and SECAM) will eventually disappear from even the technical language.

Zenith has completed tests in Montreal cable system of 16-VSB (16 level vestigial sideband) compressed video prototype package; plans to deliver units in quantity by mid '94. Because of typically high cable TV signal to noise ratios possible, Zenith has been able to increase data rate to 43 Mbits/second in 6 MHz 'channel', approximately 43% more digital data than in conventional technology. Zenith says they can fit up to 2 HDTV channels, or 23 'movies' (using 1.5 Mbps) or 9 live sporting events (4.5 Mbps) in the 6 MHz space. This raises the programme 'ante' to nearly 1725 separate movies in a 450 MHz wide coaxial cable network.

US television stations starting to talk openly about how they will utilise new 'digital bandwidth'. Under US regulations, a television station licensee may not broadcast two or more programmes simultaneously through the air. This limits expansion for US telecasters to using additional digital-created spectrum space for non-programming services. At least one group would like to try sending rental movies in spare space; others are suggesting sport scores, travel information, stock quotes, airline schedules or audio-only CD-quality music services. New Zealand networks (TVs 1, 2 and 3) will not face this problem; **CTD** has been told by Ministry of Commerce personnel that after VHF channel management Rights transfer is complete in 1994, individual networks will be free to utilise their channel bandwidths in anyway they wish; including transmission of multiple programmes using digital compressed video.

One US firm, Zenith, is predicting that with mass-introduction of wide screen HDTV at 1996 (Atlanta) Olympics, high definition TV will receive 'send off' that will result in market penetration of 10% of all US households by year 2000. Zenith predicts first US broadcasters will be simulcasting HDTV by third quarter 1994. Zenith is 'hinting' at what their own HDTV receiver will contain: **(a)** built-in digital cable TV 'converter' box, **(b)** built-in full motion video adapter for CD-I, **(c)** completely ready as digital video (tele) phone for phone-line delivered video-on-demand, or, two-way video telephoning, **(d)** totally compatible with computer square-pixel graphics, **(e)** digital 16 channel audio system, and **(f)** digital 'data' recorder (i.e. digital version of what we now know as a VCR).

Direct transmission of motion pictures from distribution centre to individual theatres has been demonstrated by Pacific Bell (US telco) and Sony in southern California. 'Dracula', in high definition wide screen form required 90 MHz (11.25 equivalent Pal-G TV channels) for transmission; information was digitally compressed to 45 Mbits/sec (equivalent after compression to 1.5 PAL-G TV channels) and sent to theatre with equipment manufactured by Alcatel Network Systems. Movie distributors are very interested in any system that can eliminate production of 1,000-7,000 separate film prints for movie openings in North America, world.

Scientific-Atlanta, original supplier to Australian Aussat receiver needs, is on an 'international roll' after its early-in-the-market announcement of digital video hardware for transmission and reception nearly one year ago. SA believes digital compression will open new markets for direct to home (satellite) broadcasting, "especially in the Pacific Rim region where low population densities have precluded DTH using analogue techniques." Firm is under contract to provide digital-based systems throughout mid-east (Orbit Communications contract with a NZ\$ value of 227 million), and South America.

CONSUMER ELECTRONICS

French Atomic screen? Although French innovation in leading edge electronic technology is seldom notable, a recent technique licensed by the French Atomic Energy Commission to US firm Texas Instruments (TI) could be the first 'favourable fall out' to come from their Pacific Island tests. A technique called cold cathode field emission emits electronics created not by the flow of electricity but rather by the presence of an electromagnetic field. TI has used the technique to develop a laptop computer display which in a demonstration model with a 152mm screen required a display screen thickness of less than 2.5mm. TI's field emission display uses cold cathode elements with a 1 micron electron gate for each display element. The elements reside within 200 microns of the phosphor screen eliminating the need for electrical focusing of the display. The overall resolution is a function of the number of cathodes per pixel. Smaller, more efficient laptop displays courtesy of Moruroa?

CFP/Colour Flat Panel display technology developed by Matsushita and now being sold in Japan (**CTD**, 9309, page 17), apparently is developing faster than creators forecast three months ago. They are now suggesting CFP's to 25" are doable, models to 40" possible but present special problems. Earlier, 20" was cut-off for doable and nothing

larger was suggested. Presently, 3,000 per month production of initial 14" model being sold in Japan (NZ\$4850) with plans to introduce into US at NZ\$5500 next September.

American consumer electronic sales broke all records during the months of September and October, contrary to sales trends in Europe and New Zealand. The USA experienced the largest retail sale months in its history for virtually every category; VCRs to camcorders to projection TVs in September, again in October (except for VCRs which slipped). Only CD (audio) players lagged. Five major electronic chain stores reported sales gains averaging 7% during October. In colour TV sets, Mexico continues to be the primary import source (53.9%; all colour) with China second (12.8% of which 62.1% were black and white). Japan was well down the list (#7) at 2.5% (of which 32.9% were black and white). During August, September and October, Korea has replaced Japan as the top source for VCRs to the USA although through September the 9 month total still favoured Japan (31.9% of year total to date versus 24.1% for Korea). In the midst of the record sales some screen sizes (25" in particular) have gone short in supply. Selectively lower pricing of major brand names has also spurred sales with the following benchmarks: 19"/483mm NZ\$344; 27"/686mm NZ\$726 with Thomson big screen 35"/889mm typically priced at NZ\$2000. Manufacturers are facing increase in picture tube prices in 1994; up as much as 6%.

Credit sales restrictions, imposed by Chinese government, are blamed for unexpected drop in sale of VCRs in China for first 9 months of 1993. Unit sales are down 20.6% compared with 1992, although colour TV sales are up nearly 5%. One expected side effect of this will be increased availability of Chinese built VCRs in international marketplace. Overall Chinese electronics output is up 20.1% from 1992 although some colour TV plants have temporarily closed due to a surplus of product to world demand. China has announced a goal of increased output in software, information systems and 'high grade consumer goods.' Most of their present products are low-end priced.

Korean's image, more specifically image of Samsung, is likely to improve in US consumer minds as a result of NZ\$218 million advertising budget planned by Samsung. Company believes most consumers in world identify Korea with low-cost consumer products and it hopes to elevate public awareness of leading edge technology as well. Samsung, with US\$9.7Bn sales in 1993 world-wide, is in fact becoming major innovator in new consumer oriented technology. Of particular interest is Samsung created digital disc videorecorder (D-VDR) scheduled for introduction in 1995. Unit combines features of cassette video recorder and disc player allowing 110 minutes of home-user video recording on 5" CD type disc, two sides. Samsung says technology came out of Russian scientific project developed for their military and uses green laser technology in its present prototype form with more advanced blue laser technology in development stage. The CD-disc storage format, Samsung suggests, will in ten years time totally replace videotape for recording and playback including rental programmes. Other manufacturers agree costs associated with 5" discs are significantly lower than videotape with the smaller size and long term storage of discs (over tape) also important features. Samsung is introducing a combo 8mm/VHS deck (NZ\$2400 region), combination video 5" CD, 12" analogue laserdisc, audio CD and CD+G player (NZ\$1800 region) during 1994. Another 'unique' product, yet with no announced distribution plans outside of Korea, is a 4 head hi-fi VCR with 4" LCD fold down screen that takes its commands on touch screen display. In NZ\$ it sells for 1250 but anyone importing unit would need to supply English/Kiwi translation as screen gives information and accepts instructions only in Korean.

'Critical mass' for CD-I? Paramount Home Video, producer of movies on CD-I, believes that 400,000 CD-I players (or Philips CD-I equipped with FMV cartridge) will represent point where initial costs of tooling, production and promotion of 5" video CD discs will be self-sustaining. Paramount projects CD-I home view universe will reach 400,000 player level by mid-94 forecasting 'explosive growth in available CD-I disc software' when that level is reached. Another producer of movies, Fox, is expected to announce CD-I releases shortly.

Version 1.1 of Video CD-I is latest wrinkle to complicate video CD 'birthing.' Existing Philips CD-I format was always considered plateau from which more sophisticated versions would build. With digital 'mechanics' there is a gradual comprehension from suppliers that software, not transistors/ICs/circuit changes will drive growth to future. Japanese firms who plan Video CD-I hardware during 1994 have received latest 'linear version' (1.1) and are modifying their own hardware plans to launch from 1.1 plateau. Philips plans additional new features (still frame video plus) by mid 94. Philips has also announced plans to gain agreement of major Asian suppliers to settle on defacto world video (+ audio) CD 'standards.' Goal is high density CD with 2 hour capacity for video (to accommodate majority of movies released) on single 5" disc. Increasing CD density involves 'double' or 'quad' technologies (doubling or quadrupling density of optical 'pits'). Creation of 2 hour minimum for 5" discs is seen as crucial to gaining support of film distributors to switch into CD video from present VHS tape format distribution. Philips hopes to have industry consensus, licensing agreements, in place by end of 1994. At recent Japan Electronic

Show Matsushita showed 3 disc changer (3.5 hour playing time), Sony showed minideck, Hitachi appeared with first TV set including built-in video CD player.

PERSPECTIVE: UK's Runaway Cable-Telco Market

Statistics are usually for accountants. This one is for telephone company CEOs.

"British cable systems connected up their 250,000th telephone customer on October 18th."

As cable industries go, Britain's has been (a) slow to start, (b) slower to penetrate (sell to) a meaningful percentage of homes passed with cable, but, (c) technically on the leading edge. With 21.6 million TV households in the UK, a cable industry that has 504,000 homes connected (2.33% of all homes) is not impressive. British cable currently passes by 2,800,000 homes and therefore 18.0% of all homes passed subscribe. Still not impressive (Dutch/Belgium/Luxemburg each has more than 90% of all homes as subscribers; the US has more than 60% and Canada more than 75%). Their numbers suggest the UK cable firms need to lay out a bunch more cable, fast, and learn how to sell their product better. The numbers suggest UK cable is not setting the world on fire. Look again.

A new number. 50.5% of all British homes subscribing to cable also use the cable company's companion telephone service. These homes (now more than 265,000 and growing at a rate of 18,000 per month) have told British Telecom to take out the BT phones. Ouch; for every home gained by UK cable-telephone, a home is lost by BT. If residential phone losses hurt BT, business phone losses wound. Between October 01 1992 and the same date in 1993 UK cable gained 16,991 new business phone customers; a gain of 247.5% in 12 months. Losing a residential customer is lost \$\$ but losing a business customer is lost \$\$\$\$. Or more.

British cable started late, but discovered the merits of fibre optic cables (huge, unused bandwidths) early. With home interest in multiple-channel cable TV lagging (for every British cable customer, Murdoch has 5 British home satellite dish customers; 2.5 million UK dishes versus 0.5 million UK cable homes), British cable discovered telephones. Their fibre optic plants could handle telephone connects and they could offer this service at prices up to 50% lower than BT's often antiquated telco plant. Once UK cable had the telephone hardware in place and began to advertise new customers came out of the woodwork while existing customers begged to be 'next in line' to have their BT telephones removed. UK cable is now in the unexpected position of having people sign-up for cable TV just to get the cheaper telephone; telephone savings per month often more than pay for the cable cost; two for the price of one. The ultimate marketing trick.

BT's only significant domestic toll-call competitor, Mercury Communications, not adversely affected by most of this anti-BT sentiment, then did a brilliant thing by signing a deal with the cable operators to provide low cost toll (national and international) interconnection for cable-telco customers. Now the cable-telephone savings were escalating and BT noticed cable firms were working not only seven days a week but also at night laying more fibre optic cable. BT, plainly concerned, responded by offering 'sweetheart deals' to cable firms if they would interconnect with BT rather than Mercury. The UK cable-telephone customers are loving it, seeing their telephone costs come down and taking a slap at BT in the process. It's in the best of British traditions to hate your (until now) monopoly telephone company.

World money sources are also loving it. Singapore Telecom, every dial-tone as conservative as BT but recognising a good deal when it sees it, has recently invested US\$200 million into UK cable stocks. The market value of UK cable franchises has soared 10X in less than 12 months. It's the biggest crap game in the communications world these days as totally unbuilt franchises (mere pieces of paper; simply a license to build a system) have grown from a street value of US\$15 per uncabled home two years ago to more than US\$300 per uncabled home today.

Closer to home? NZ Telecom's Jeff Carter, in explaining why Telecom here is investing a reported NZ\$2M in the Auckland fibre optic suburb tests said it all:

"Telecom is ensuring its core businesses (telephone services) are protected from newcomers who get established in cable television first."

To which Kiwi Cable Ltd. CEO Todd Klindworth responded to CTD:

"I've never made any money operating a cable system; you only make money when you sell them."
Perhaps to Telecom, Todd?

Apple is apparently first computer company to offer early stages multimedia package. 'Macintosh TV' combines Apple LC520 computer (introduced in June to educational market: 160 MHz hard drive, 2 speed CD-ROM, 5 MHz RAM, 32 MHz clock to play photo and audio CDs) with Sony Trinitron colour tube and computerised full function TV receiver including full 'cable-ready' tuning, teletext/closed captions with twin (stereo) speakers in case. Through software/hardware marriage, unit is able to 'capture' to disc images seen on TV screen, automate programming search (using computer software). Screen size is subject of some debate; in TV world it would be 13", in computer world same dimension screen is called 14"; Apple calls it 14. Pricing through various US outlets including specialty stores on major university campuses ranges around NZ\$3,400. Users can watch TV, or compute but not both at same time. You can, however, listen to TV sound or use CD drive to play music while computing. A future model is likely to add VCR functions as well.

Sony's new 5" Walkman TV package employs short-neck design picture tube and includes AM/FM radio, ability to function as monitor for AV equipment, earphone jack and will operate on AC or DC. Retail price around NZ\$640. Sony is now delivering ultra-tiny 8mm player to airline industry designed to fit into plane seat-arm for in-flight entertainment. Latest long-haul plane retrofits include individual viewing screens for each passenger and optional (fee charged) selection of movies, programming.

Sharp, somewhat contrary to its Japanese competitors, is bullish about its near and long term prospects in the consumer electronics world. The firm believes its lead in LCD based technologies will position it for continued growth as other Japanese firms are struggling to re-identify growth markets. Sharp is increasing its investment in research and development; to 10% of gross sales in the current fiscal year (ending March 31). Sharp believes LCD is in its 'first technological generation' and forecasts TV receivers, computer displays and imagery screens as large as 25" will be LCD ultimately. Sharp's hold on LCD technology, through patents, is considerable and they forecast a replacement of glass displays with plastic displays perhaps as early as 1996. Sharp is also more optimistic about the world wide conversion to digital than some of its competitors, suggesting consumer digital VCRs will be available by the end of 1994 or early in 1995. This is approximately one year earlier than most believe. Sharp suggests that as soon as LSI (large scale integrated chips) designed for digital VCR (and TV) are readily available, digital TV will take off with pricing that will be 2 to 3 times analogue only for a short period of time, then ultimately lower than analogue.

Sanyo has reorganised basic research assigning 400 engineers to projects that will result in products over next 1 to 5 years, will double force within 3 years. A second group concentrating on projects with maturity 5-10 years away will number 1,800 engineers by early in 94. In more meaningful change, Sanyo is merging discrete semiconductor and VLSI (very large scale integration; 'super chips') technologies into new Microelectronics division. Faced with a shortage of innovation in Japan, Sanyo is taking steps to correct trend.

In new product area JVC now has on sale in Japan new ST-210 videotape which will record/play 10.5 hours in VHS EP mode. New ultrathin tape uses JVC proprietary technology, has unusually high strength. Blanks sell for NZ\$51 at introduction.

Israeli inventor has created VHS double-tape transport 'time shifter' VCR which with new JVC tape can hold total recording time of 21 hours (10.5 per transport). System automatically locates reusable or unused portions on tape drives to record new material with on screen prompts directing user as to material archived or available for replacement.

Sanyo/Fisher will not ship expected 8mm camcorder with LCD screen external viewfinder 'until yen exchange rate improves.' Model FCV-30 with 2.2"/56mm LCD screen was to sell in US at US\$999/NZ\$1818 but with yen exchange rate remaining in 107 = US\$1 range unit cannot be marketed profitably 'at this time.' In similar move, manufacturer Yashica has dropped totally out of US camcorder market; models came from Sony. Giant Mitsubishi has ceased camcorder production totally, will sell off balance of sizeable inventory, has not announced whether it will resume production. Company is known to be making major engineering effort to perfect digital video VCRs/camcorders and may hope to be first or early in this new market. Several Japanese analysts suggesting plurality of firms getting out of analogue camcorder production is precursor to wholesale to digital format equipment by Japanese OEMs but don't assume it will be digital VCRs. Increased R & D emphasis is being placed on CD as user reusable recording method with digital compression require to get necessary capacity per CD.

Advanced interactive multimedia designer 3DO, with investment from AT&T, now has Matsushita agreeing with AT&T to jointly develop communications hardware to interconnect via telephone lines (or two-way cable systems) two or more 3DO terminals by mid 94 to communicate with one another directly and manipulate each other's 3DO

hardware/software. 3DO, presently floating new US\$37.5 million stock offering, says it is 'on schedule' with present introduction of players in US Christmas market; 50,000 units expected to sell.

Sony, in announcement that surprised many, has entered the video game market with 32 bit (advanced architecture) proprietary game system that adds yet another layer of non-compatible gaming software to the already complicated marketplace. Competitors (Nintendo, Sega, 3DO et al) were near unanimous in reaction: "It all boils down to software." None doubt Sony's ability to design, produce and market hardware. But within the game creation field there is near overload of design formats all narrowly focused on a relatively small number of established software game creators. One US software company official summed it up: "(Sony) would be merely one more system to consider in allocating our own time and dollars (in creating new software)." Because games require individual language versions for each marketplace, Sony will rely for its 1994 Japanese debut on Japanese software creators (Japanese developer Namco has been announced); planning a 1995 sales launch in USA thus giving software creators sufficient lead time, it hopes, to come up with Sony format software. Sony at one point tried to bring to market Super Nintendo-compatible (Play Station) hardware unit but has apparently abandoned that plan with new self-designed hardware product line. Using a CD-ROM package, and digitally compressed data, Sony believes it has several 'faster, more impressive graphic displays' in its system than competition. It says displays will be comparable to high-end arcade games and full-motion video. US analysts were not as surprised citing Sony's present financial problems compounded by overall Japanese slump in consumer hardware. Many suggested Sony may be signalling entry into more software oriented segments of consumer business fearful that as more of the consumer electronics originates in lower cost Asian countries the days of Japanese hardware domination are rapidly declining. Sony denies first games are a part of a 'larger strategy,' but it has announced opening of new 'Sony Software' office in Brussels, first for Europe. They will concentrate on TV programming sales and development, electronic publishing, music, film and home video software.

Blockbuster (stores), world's largest chain of video rental outlets, is testing CD-ROM rental in more than 50 San Francisco area stores. Special kiosk displays, in-attendance CD-ROM 'tutor' plus array of handout printed literature is addressing consumer education phase of CD-ROM. Five hardware formats (3DO, CD-I, IBM PC, Macintosh and Sega CD using Genesis console and CD peripheral) are stocked for rental along with 250 CD format software titles at each store. Rental hardware systems are going out for 3-day period at NZ\$27.21 with software titles at NZ\$7.28 for 3 days. Blockbuster is also offering each hardware and software title for sale as companion test but only to capture those who rent first and become 'hooked' on new technology. Blockbuster feels potential of CD-ROM is great and hopes that test in first 50 stores will show a similar programme expanded nation-wide in USA would drive up consumer use of CD-ROM rapidly. West Coast Video, 2nd in size in US to Blockbuster, has also opened a 'test store' for interactive multimedia hard and software. Calling new outlet Game Power Headquarters, test Pennsylvania facility has Genesis CD, Nintendo, Panasonic 3DO, Sega Genesis and Super Nintendo hardware plus new Commodore CD32. Customers try before buying using slug-coins available through store employees (thereby reducing game hogs) with 4 minutes per slug. Rental of software is similar to Blockbuster (NZ\$7.26 for 3-day software rental), issues credits against soft or hardware purchases to renters. West Coast Video hopes to have 100 Game Power Headquarters franchise stores open by end of 1994; cost estimated at NZ\$182,000 per store all inclusive.

Australian sale of Nintendo games will continue to be handled by Mattel Pty Ltd but Nintendo has formed separate Australian company (Nintendo Australia) to oversee marketing, distribution and administration. Australian based Beam International is being sued by firm American Software which claims Beam failed to deliver per contract its 8-bit Nintendo Space Punch Out programme.

Atari 64 bit Jaguar game has debuted in US but is backed initially with only 4 software options. Tooling for this Christmas season, Atari expects to ship around 40,000 units that retail for NZ\$450 by end of year. Sales of 500,000 units are forecast for 1994 with CD-ROM attachment to be available in mid-94 at around NZ\$350. New software developers have recently been named.

Sega sold more than 1,000,000 Genesis units during record month of September. Competitor Nintendo has revised downward March 31 year end profits expecting 18% drop in sales for complete year from previous forecast. Firm is also launching trial of software delivery in 500 homes connected to Tokyo's cable TV system.

DCC and MD audio formats continue sparring; this time at Japanese Audio Fair in Tokyo. Sony's MD (minidisc) format picked up the support of Toyota (will place MD in some models of 1995 cars) and Nissan. DCC, basically pushed by Philips, has added promises from audio manufacturers JVC, Kenwood, Sony, Aiwa and Alpine to have models in the marketplace during 1994.

Pocketview electronic book may be forerunner of new application of digital technology which could threaten specialised reference-book publishing/printing/distribution business. Franklin Electronic Publishers has recently created pocket LCD-like display catalogue for parts supplier Allen Bradley containing full specs of more than 100,000 A-B products. A new ROM-card product titled 'Mayo Clinic Family Health Book' is scheduled for 1994. Five line LCD display allows sales people, users of products to locate specific part and specifications in seconds, replacing nearly 50 pounds of catalogues. Current model has 20 megabit memory and sells in US\$100/NZ\$180 range. Newer smaller model will sell for half that price and offer optional (radio) paging receiver built-in.

A voice powered Newton? Not quite, but getting closer. Voice Powered Technology (USA), creator of the VCR voice-instructed VCR Programmer now in the marketplace has released at NZ\$360 the Voice Organizer. It retains up to 99 separate voice memos or calendar type entries and will read them back to user at scheduled time in user's voice. It also will hold up to 100 telephone numbers and to locate number the user simply speaks the person's name into VO and it responds with the memory telephone number. The nicad battery powered unit has a lithium battery backup to hold the recorded data, a four-function voice calculator ("200 times 6 divided by 14.7 plus 9..."), and 4 (optionally 8) minutes of digital recorded speech memory; all slightly larger than a pack of cigarettes. "Beam me up, Scotty!!" Don't rush to Bond and Bond yet; only 15,000 are available this month, world wide. Second generation, expected 1st quarter of '94, adds automatic expense account organiser and auto phone dialler acoustical coupler (except in Australia; see following report). VPT has entered agreement with JVC allowing latter to use voice powered technology with its line of consumer electronic products.

Apple's Newton may still be off the Australian market after bureaucrats discovered unit's built-in acoustic coupler designed to transmit Newton memorised telephone number tones into telephone mouthpiece does not meet 'Australian standards' for tone generation. World-wide, standards for tone 'quality' (frequency), level (loudness) and sequencing (period of each tone) are required for proper dialling of numbers by (for example) computer modem or FAX machine. Apparently only in Australia are the regulations written (and enforced) such that acoustical couplers (rather than hard wire couplers) must conform to specialised standards. When the 'enforcers' discovered Newton could 'transmit' (through its loudspeaker) telephone number tones to the mouthpiece of a telephone, it told Apple to "immediately take Newton off the market" or face significant (A\$200 for each unit supplied) fines.

Wireless master remote control from Sony will select, operate many brands of video/audio units as 'master home remote system.' VisionTouch has egg-shaped wireless 'mouse' with joy stick control allowing user to command on-screen menu. Instructions entered use infrared controls to re-interface with VCRs, audio systems et al. System can be expanded and with user-created menus control everything from house heating/air conditioning to telephone system. Not cheap; NZ\$3100 range.

Who's owns' 16:9 aspect ratio? Although technology leading to 'widescreen TV' (16 to 9) is widely based over several continents, one variation of 'interim 16:9' may have single patent holder. As reported in CTD for September (page 18) Korean firm Samsung has patent pending in Europe that allows a picture transmitted in 16:9 to be 'shrunk' electronically by TV receiver to 4:3 (present aspect ratio). Now it turns out Korean firm Goldstar has a European patent filed in December 1991 which does the reverse: it takes 4:3 picture and stretches it to 16:9 so that viewers of 4:3 transmissions on 16:9 screens believe they have widescreen pictures. JVC demonstrated a system in 1992 which stretches edges of pictures only; centre of picture is unaffected by 'stretch' and thus no centre of action picture distortion occurs. Philips has demonstrated a similar system. Goldstar's patent would appear to predate Philips or JVC technology and if there are dollars to be made in licensing the technology, they will apparently flow into Korea regardless of whether picture is stretched or shrunk by 16:9 advocates.

Standards for defining suitable camcorder "lux" (light level) sensitivity ratings are subject of new US industry study. Tests of major brands revealed wide variation in camera performance when subjected to identically lit scenes often contrary to the manufacturer's claimed sensitivity ratings. Study has determined camcorders sold with '8 lux' rating in Japan are marketed in US as '1 lux' (the lower the lux rating, the more sensitive the camera claims to be in low light level applications). Study underway will attempt to put numbers and procedures to ratings including measurement of picture 'cleanness', signal to noise, resolution and brightness.

Videosnap is new Hong Kong innovated technology; miniature 1" LCD screen allows user to 'freeze' video image of choice and, when selected, push button to create Polaroid-style print that is equivalent to approximately 240 lines of resolution (VHS grade). Unit will be offered for sale in North America at NZ\$900 range.

Glasses that double as a TV receiver are on sale in the USA. The 4.5 ounce glasses give the user bifocal quality vision by projecting the image onto an imaginary screen that appears approximately ten feet in front of the wearer. By bringing your eyeballs 'up' to the top portion of the glasses, the user sees a TV picture from the miniature tuner.

that is battery powered stuck away in a pocket or clipped onto the belt. By bringing your eyes down, the user sees normally. The device is especially popular with sports fans who can sit in the stands and watch the play live, or by rotating the eyes upward catch the instant replay.

Legal battles over who owns patent and trademark rights to the various software driven television programme scheduling services have begun. In USA, several companies have created electronic programme guides which are transmitted via satellite or through data channels to give consumers constantly updated scheduling information. With 200+ satellite TV channels now, as many as 500 promised with shift to digital compression, the formerly 'simple business' of producing an accurate 'real time guide' to programming has become very complex. StarSight Telecast, one player in field with interactive electronic programme guide, has filed suit in California court claiming GemStar has infringed on StarSight patent covering interfacing between VCR and cable TV set-top converter boxes. The patent covers a system which converts channel tuning into microprocessor remembered information and then relates VCR commands to channel tuning for proper control of the VCR. StarSight has also filed suit against United Video Satellite Group claiming it too violates firm's patents with Trakker version interactive guide distributed via satellite. In similar suit, Compton's NewsMedia is claiming they hold sweeping 'basic patents' for software technology utilised by most multimedia programmers. Firm says method by which software data is 'searched' for specific material is covered by their US patent 5,241,671 which uses "database search system that retrieves multimedia information in a flexible, user friendly system."

Funai VCRs manufactured at Guangzhou plant in China under Sony license are subject of law suit brought by Sony. Firm says it cancelled Funai license for VHS VCR technology in June claiming Funai was not providing accurate shipment reports for purpose of paying licensing fees and claiming in court papers Funai has destroyed or 'lost' relevant records covering period in dispute. Agreement, renewed in 1991, ran to 1996 and Sony seeks NZ\$30.9M in suit. Funai Chinese plant, building VCRs under its own OEM name as well as Symphonie name, began shipping in quantity in May, planned 300,000 per month by next April (**CTD 9311**; page 24, 'Perspective'). Sony originally developed several proprietary methods for eliminating on-tape 'guardbands' between slanted track recording lines and used technique in Betamax. Under 1970 accord, Sony, Matsushita and JVC agreed to cost-free 'cross licensing of patent rights' and this led to development of VHS system. Outside of the three system developers, others pay licensing fee (royalties) when using patented techniques. You cannot build a compatible VHS machine without using the techniques so Funai, without licensing agreement, is in theory out of the VHS machine business if they lose the suit.

CES/Consumer Electronics Show annual gathering in Las Vegas (January 6-9) will be 'largest ever': more than 1,600 exhibitors, 950,000 square feet exhibit space, 79,000 people expected. Exhibit hall growth areas from 1993: videogames up 18%, computers + 20%, home theatre systems 29%, cellular 79% and rapidly emerging 'multimedia' equipment up 603%. CTD will have CES Show Report in our next (January 26th) edition.

CABLE/FIBRE OPTIC TELEVISION

TV3 CEO Ken Clark has told **CTD** his network *"has not granted Kiwi Cable TV (Paraparaumu) permission to carry TV3 signal"* on cable. Kiwi's Todd Klindworth had previously told **CTD** he found TV3 *"Far more cooperative in granting permission than TVNZ (for TV1 and 2)"* leaving impression he had TV3's written permission. In letter to **CTD** publisher Robert Cooper (12 March 1993) P.G. McCabe, policy advisor at Ministry of Commerce, wrote, *"There is, in our view, no legal impediment at the present time to a cable operator receiving and distributing TV1, TV2, TV3 and TAB signals without their express permission..."* If letter had been written today, his list would have also included CRY TV, Max TV and any other 'free to air' broadcasters. McCabe's MOC view is that under (the) Copyright Act of 1962 cable companies require no approval from free-to-air telecasters to carry and distribute free-to-air signals via cable. TV3's Clark speaking to **CTD** has different view: *"There are alot of wrinkles (yet) to be worked out. How do the programmers or networks protect their copyrights? There is no clear cut path (in New Zealand) for the collection of copyright fees (for secondary transmission / cable distribution) and I do not see how the present law grants cable operators the right to carry our signals unless there is an agreement to do so."* Clark reiterated he had not granted Kiwi Cable permission to carry their signal noting *"I told Todd Klindworth 'you are on your own if you carry our programmes,' and, in fact, I'm not certain that under the (1962) law, or under the terms of our programming contracts TV3 even has the right to grant such permission."* Clark was also not certain he was in a position, legally, to negotiate such 'use rights' of his signal for cable even if the would-be cable operator wished to negotiate. An overview/review of New Zealand copyright laws prepared by the Justice Department is reported

ready for introduction to the (next) Parliament. See separate related report under 'Terrestrial Broadcasting' here (follows).

Greymouth's proposed cable system, PacSat and backed by John Rutherford's Civic Enterprises Ltd. (Christchurch) had scheduled 'before Christmas' launch of its service based upon availability of TV3 via Hokitika TV3 'relay'. PacSat hoped to pick up (new) Hokitika channel 11 signal directly, but failing at that was prepared to install 12 GHz range microwave link to bring TV3 signal north to Greymouth from Hokitika. Rutherford, perhaps conscious of the unresolved 'copyright question', planned to offer TV3 on Greymouth system 'free', i.e., not charge for its availability on cable thereby side-stepping, for now, the copyright liability question. PacSat planned four to five separate cable service channels, including TV3, the balance made up of a local community channel and imported (on tape) programming from Canada, USA plus possible satellite feeds. PacSat's Keith McDonnell told **CTD** they hoped to have 15 'blocks' of Greymouth cabled by Christmas and arrive at the 500 subscriber level by the end of February. Apparent failure of TV3 relay at Hokitika (see Terrestrial Report, to follow), technical difficulties with 24' (very) used screen mesh dish and PacSat's inability to negotiate a pole attachment contract for crossing streets with their cables, through local power company, all point to likelihood system will not be operational by 'this' Christmas.

PacSat has issued an 'invitation' to members of the New Zealand film/video programming 'industry' to create programmes for airing on cable here and abroad. PacSat believes that educational material, including 'infomercials,' produced in New Zealand can be placed on overseas cable service channels. They have an initial goal of 80 half-hour programmes to create a 40 hour package of materials to be shown first here on cable, later on independent television in New Zealand, ultimately overseas. Information from Keith McDonnell (P.O. Box 1959, Christchurch; FAX 03-366-2660).

The first fibre optic design 'community cable' television system service in Australia kicked off October 31 using Paddington and Central Park Telecom (Australia) 'trial FO network.' Customers are not being charged (unlike similar Auckland area FO 'tests') for service.

Delivery of first cable TV interactive 'digital set-top converters', essential building block in 'digital super highway', has been delayed. Major supplier Jerrold (division of General Instruments) planned introduction of analogue version interactive set-top now, digital version next June. Analogue now put off to June, digital delays expected. Unit uses Intel 386 chips and Microsoft Windows, is essentially computer in set-top box, allowing viewers to order up data, programming, plus merchandise through cable TV system. Analogue versions will cost cable operators in range of NZ\$435, digital versions NZ\$680.

NZ Telecom investor, US firm Ameritech, is studying replacing existing copper wires into approximately 1,000,000 (US) subscriber homes with hybrid fibre optic/coaxial system (close in concept to Auckland New Lynn/Pakuranga 600 home test). Company believes for it to be competitive in 'telecommunications information super highway' environment it must do away with copper wire limitations of 'last mile' (**CTD**: 9309, feature report). However Ameritech is also considering possible uses of 27-29 GHz 'CellularVision' concept as substitute for costly replacement of existing low-bandwidth copper wires presently connecting customer homes.

Ameritech taking lead from successful Bell Atlantic test of US laws prohibiting telco entry into cable (**CTD**: 9311, page 30) has filed near-identical challenges in Chicago and Detroit seeking its own ruling to start cable TV.

Hong Kong's Wharf TV began service on schedule (01 November) but is faced with the threat of competition. Local telecom (Hong Kong Telecommunications Ltd.) announced two days after Wharf began operating they will build cable TV system as well in mid 1996. Wharf's exclusive franchise for cable runs out at that time. The telecom loses its own exclusive right to Hong Kong telephony in 1995 and there has been speculation Wharf cable would, like systems in the UK, add local telephone services at that time. Hong Kong Telecom is 58.8% owned by British Cable and Wireless. To pave the way for cable TV, Hong Kong Telecom said it will begin testing video on demand (movie et al) services through its telephone lines to 400 'sample' homes in mid-94.

British Telecom is testing Philips prototype video-by-phone (Philips Home Interactive Multimedia Terminal) which processes compressed digital video from 1.5Mbps/sec to an analogue PAL (NTSC) signal. The terminal is described as being in three major parts: a 'standard' TI communications interface, the control system, and an

TERRESTRIAL TV TELECOM NUMBERS

Subject to summer vacation schedules, readers may need to contact one or more of the following: Ian Hutchings, MOC/04-472-0030; TV3 engineering / 09-366-5999; NZOA/04-382-9524; SKY Engineering /09-579-9999; BCL Engineering /04-382-6000

MPEG-1 decoder using either a Philips or Motorola MPEG-1 decoding chip (the chip is also used by Philips in their CD-I player).

London is to have its own 'city' cable television channel by April 1st. In a bidding process, newspaper London Daily Mail partnering with a London TV production house won the rights to create a cable-only service for London's estimated 250,000 homes presently connected to cable. Calling itself 'Channel 1', the new venture suggests it will essentially be 'England's 5th TV service' (four others are free to air) and could be expanded throughout England via cable system interconnection. The venture has a budget of NZ\$95 million with the expectation it will be breaking even at the end of third year of operation.

Australian AWA Ltd which is promising to bring video-on-demand through Australian copper phone lines into subscriber homes has teamed with German Siemens to perfect the technology required for the new service.

3DO interactive system will be tested in Omaha (Nebraska) fibre/cable prototype system. TV decoders going into up to 100,000 homes will be equipped with 3DO 'chips' and cable network operator US West will install graphics, software at cable 'headend' allowing cable customers to call up on demand videogames, movies, participate in electronic shopping.

Hewlett Packard will provide new VidJet Pro print manager (available this month) to Orlando (Florida) test of cable television interactivity. With system, cable viewer can select any scene on incoming video lines and create colour print on (HP) printer. HP sees opportunity to merge interactive cable technology with computer and print technology to benefit of consumers.

Federal Communications Commission (FCC) study of existing US cable systems suggesting that the industry will spend in excess of US\$43B to complete its own upgrade to fibre optic mainline (trunk) and feeder (distribution) cables. Virtually all new cable TV system construction (including rebuilds of older plants) in US now uses 750 MHz bandwidth equipment. Most systems are being designed with either 2000 or 500 'subscriber nodes', effectively making each node a 'cell' into and out of which fibre optic lines can in the future interconnect for two-way signalling, telephony, interactive signalling.

State of Pennsylvania through state cable operator association is pledging US\$300 million to build circular state-wide fibre optic network that will create 1 GHz+ 'information superhighway'. Pennsylvania cable operators pioneered a state-wide private microwave network more than decade ago, allowing the transfer of cable programming throughout state. Proposed fibre optic system would offer nearly ten times the capacity of the microwave system and compete directly with Bell of Pennsylvania system.

Bell Atlantic court ruling allowing it to compete with cable in Virginia (CTD 9311; page 30) is as expected being appealed. US Department of Justice is asking higher court to review case. If higher court rules against Bell Atlantic, additional appeal is likely and ultimately US Congress may be forced to deal with cable-telco ownership issues. US Senate Antitrust committee hearings on proposed Bell Atlantic and TCI (cable) merger underway with many more months of official query likely before merger can be signed.

New England Telephone says it will test in 1,500 homes Video On Demand service through system that combines fibre optic and coaxial cables. They plan 110 channels in 'network' using serving platform that will offer either analogue or digital formats as early as January.

Bell Atlantic is responsible for the next phase of development of 28 GHz CellularVision trials in suburban New York City. BA bought minority interest in experimental service in August but little has been said about the service since that time. CellularVision offices in NYC report they have no information about system expansion, directed queries to Bell Atlantic whom they said is responsible for system expansion and marketing in future.

Aspiring New Zealand/Pacific cable TV operators seeking expertise in raising funds to build systems may find new office of Communications Equity Associates helpful. Firm pioneered North American cable funding industry, now has office in Kuala Lumpur, Malaysia (Bashir Shariff; 00-603-292-5792).

TERRESTRIAL BROADCASTING

Major impediments have developed to providing TV3 coverage to isolated South Island west coast community of Hokitika (CTD; 9311, page 31). The town raised \$28,000 locally to develop retransmission on VHF channel 11 of the TV3 signal after a joint effort by would-be cable operator PacSat (Greymouth) and translator entrepreneur Steve Fogarty (Motueka) located knife edge refraction signals across Southern Alps from Christchurch TV3 transmitter. Ministry of Commerce has ruled only TVNZ or TV3 may actually own and be responsible for any TV transmitters operating on a VHF channel. Hokitika 'group' went to TV3 engineering firm JDA Associates for engineering approval of service since without TV3 approval of signal quality, project would stop. JDA passed the request to TV3 proper

where permission has been held up. TV3 does want their signal available on West Coast of South Island; it is an area without service at moment, but has been negotiating with NZOA for massive (\$16M) funding package that would complete TV3 service in major 'white' (unserved) regions of North Island (Far North, pockets elsewhere) and South Island (Queenstown region, all of west coast). If TV3 approves the Hokitika 'self-help' translator, they fear this could set precedent and jeopardise their negotiations with NZOA. Steve Fogarty claimed he was ready, with equipment in hand, to inaugurate Hokitika service 'by Christmas'. As a practical matter, without TV3 approvals translator would be unlicensed and subject to close-down and confiscation by ROG acting under Ministry of Commerce guidelines. The losers here are the people of Hokitika who enthusiastically raised funds for station but now must stand by while TV3, NZOA and others fight a bigger battle of national funding for TV3 expansion.

TV3's Gerry Smith has told **CTD** "With the completion of the expansion to Timaru (54,700 viewers), Oamaru (13,000 viewers) in November, except for a few pockets in and around Auckland and Wellington proper, we are done with TV3 financed expansion." TV3 claims at this point to serve 93% of New Zealanders, leaving 245,000 Kiwis without TV3 service. TV3 and NZOA continue to negotiate use of annual (NZOA collected) license fees to further expand TV3 based upon fact that between 1976 and 1988 pre-NZOA government agency funded TV1 and 2 expansion into low population 'rural' areas. TV3 presently operates 65 transmitter sites while TVNZ operates 843 transmitters; 50-50 between TVs 1 and 2 (422 per programme channel on average). Between TV3 and NZOA it has been agreed that TVNZ sites presently serving fewer than 250 people will not be considered for TV3 expansion. TV3 wants an estimated 150 additional sites created, and funded by NZOA, to reach new people (but no new transmitters at sites that serve fewer than 250 people). The estimated cost for this is around 16 million dollars; nearly 19% of the presently available NZOA annual funding. NZOA favours a totally different approach, a subject we will investigate in **CTD** for January (9401: 26 January issue date).

Auckland's music video service, MAX TV, initiated operation from common Waiatarua site running just 800 watts of transmitter power. Tests conducted at sites around Auckland found their signal from 30 to 40 dB lower in level than Sky or TAB in most areas. BCL, responsible for the transmitter on channel 49H, was unable to provide the allocated power when the station signed on late in October. MAX TV should be up to power plus be running on channel 57H from Pine Hill and 46V from Remuera by the time you read this.

Action TV/TAB call for bids to utilise air time not in use for race coverage should result in public announcement at about time you read this. If 'favoured' Australian connection wins unused Action TV transmitter time, expect plans for 'regional TV' to slow down while backers of regional network regroup.

Auckland's Regent Hotel is due to begin operation around Christmas day of brand new 'pay-per-movie' system that the installers claim is first such system in New Zealand. A US firm has engaged newly formed Cablevision Systems (Randall Francis, PO Box 488, Albany, Auckland) to modify the existing Regent MATV system and install the new equipment. Two hundred VCRs will be installed at the hotel, giving each room access to a recently released movie on demand at a charge of around NZ\$18 per movie. The system rebuild (estimated NZ\$500,000) is being paid for by the US firm and reportedly the Regent has none of its own money involved. The system owners calculate a two-year pay-back based upon experience in similar installations elsewhere in the world. The Regent, like most New Zealand MATV systems, was originally designed and installed prior to the introduction of UHF channels here. The system will require extensive rebuilding and the new movie channels will be distributed in the upper VHF range just above channel 11 (i.e., above 230 MHz). Regent TV sets are 'cable ready' and capable of receiving the new channels. In the room, a set top 'interactive' converter takes the customer's movie order and instructs a tape deck to send the movie to the room. A small microprocessor adds the rental cost of the film to the consumer's bill which is paid at time of check-out. A similar installation is going into a Sydney (Australia) hotel at the same time with local installer Cablevision Systems helping out there as well. The new electronics for the Regent has been prebuilt in the US and shipped to Auckland as prewired modules ready for installation. The Regent, like most metropolitan hotels, had previously added Sky's 3 channels as in-room service. However, in the case of Sky, hotels pay sizeable fees, and they do not share in the Sky revenue stream (rather they pay fees each month for Sky). With the new pay movie system, the hotel receives a modern broadband delivery system at no charge, and, they share in a percentage of the revenue collected for each movie viewed. A similar deal has been signed between US communications company Comsat and the (Australian) Park Lane Hotel chain.

Transmitter offsets, the minute variations in TV transmitting frequency assigned by ROG to reduce cochannel interference, has been obtained for BCL owned sites now in use by Sky/TAB. They are as follows: Auckland / 0 offset; Te Aroha / 0 offset; Kaukau / -10.4 kHz offset; Sugarloaf / + 10.4 kHz offset; Baxters Knob / + 10.4 kHz offset; Fitzherbert / - 10.4 kHz offset and Rotorua + 10.4 kHz.

STATISTICS/ QUICK UPDATE to October 31, 1993

October imports of consumer electronics saw prices paid down while 1993 volume continues to run significantly below 1992 levels. In our own five product mix tracked: black and white TVs (93 imports at 44.3% of 92 levels) had an average value of (NZ) \$375.43; up from \$311.64 (September), \$324.82 year to date (YTD); colour TVs (93 imports at 95.5% of 92) had an average value of \$525.67, down from \$572.57 (September) and \$552.63 (YTD); Camcorders (93 imports at 68.8% of 92) had an average value of \$1162.90, down from \$1232.77 (September) and \$1224.27 (YTD); VCRs (93 imports at 112.0% of 92) had an average value of \$468.51, down from \$483.43 (September) and \$478.03 (YTD); Audio CD players (93 imports at 63.3% of 92) had an average value of \$208.85, down from \$263.87 (September) and \$257.14 (YTD). **CTD** provides in-depth analysis of imports, price trends, and import sources for the year 1993 in our February 25 issue (#9402).

A new channel 10V TV translator at Aurora (south of Mt. Egmont) is due on the air prior to Christmas, taking TV1 programming from Wharite and relaying it down the line to Pihama/Opunake.

DAB (digital audio broadcasting) is now scheduled for 1995 launch in the UK. Tests are underway utilising a 10kW transmitter located at Crystal Palace supplemented with 1kW transmitters at Reigate, Wrotham and Alexandra Palace. The UK plans to use frequencies between 225 and 230 MHz for DAB service and other European countries are studying their own DAB allocations options. With DAB transmission, the reproduction quality associated with (audio) CD players is broadcast in digital form. Multiple programme sources share a common transmitter which radiates a 'band' of radio frequencies containing the separate programmes. The test transmissions are in the 226 MHz region.

Sky TV broadcast from the Te Aroha transmitter sites has been located on knife edge refraction in several spots near New Plymouth at signal levels more than suitable for rebroadcast over the Sky-less community. Signal searcher Owen Barriball (Private Mail Bag 40, Pungarehu, Taranaki) reports the Sky signals in some spots are "only a few feet above the ground and dead level with the horizon" while at other locations "the signals are at elevations of 50 to 100 feet and at takeoff angles as great as 30 degrees with polarisation skew of up to 20 degrees to the right." Sky has not yet announced a transmission schedule for the New Plymouth region.

Whangarei, said to be 'next' on the Sky expansion list (after uncompleted Hawkes Bay, Dunedin), is not waiting. TV installers are relearning the 'joys' of fringe area reception, especially in eastern portions of community along and adjacent to Riverside Drive near Whangarei Airport. Long yagi antenna arrays, 30 dB gain low noise masthead amplifiers are being installed to capture 'scatter level' signals arriving from Auckland's Waiatarua Sky transmitters. Picture quality is less than perfect but pubs and others are investing anyhow. A bonus: TAB's racing channel service also comes through. (NOTE: **CTD** sister publication **Tech Bulletin** issue 9303 provides 38 pages of technician-level UHF fringe installation guidance including large antenna array design. Specify **TB9303/UHF** at \$15 from Robert B. Cooper, P.O. Box 330, Mangonui, Far North.)

300mW unlicensed FM service manufacturer Vexx Digital FM Ltd. (10 Relko Cres., Torbay, Auckland; 09-473-1818, Jay Mather) has taken Hoyt's Cinema (Glenfield/Auckland) transmitter on 100.4 MHz off the air. Mather told **CTD** his firm is finding local Council authorities 'uncooperative' concerning the posting of signs directing people to tune in the low-power transmitters for their information services. Hoyt's sought permission to mount sign on its own building advising car drivers to tune-in 100.4 for movie schedule at theatre; council turned down repeated requests and applications, ultimately demanding higher fees for 'sign approval' than entire cost of transmitter system. Mather says this could be a significant impediment to the development of his 'talking billboard' service since tourists and others will have no way of knowing about services unless signs are posted advising them to 'tune-in'. Mather has signed up his first regional distributor (Whangarei-north) and is developing programme to appoint other 'exclusive' distributors in geographic districts of New Zealand. Competitor Tourist FM Ltd. is hoping to get around the 'sign posting problem' by working with car rental agencies, tour development facilities to have its list of transmitters printed in material handed out to tourists when they arrive in New Zealand (**CTD**: 9309, p.23). Ministry of Commerce revised RFS-29, rules defining and regulating 300mW devices in marketplace, was scheduled to be released 15 November but had failed to appear at our post-01 December publishing deadline.

NEXT ISSUE OF CTD: Issue date 26 January (issue 9401) focuses on the New Zealand dilemma in coming to grips with explosive technology as we privatise telecommunications.

INTERFERENCE TO TELEVISION RECEPTION

Responding to an Official Information Act search of Ministry of Commerce files, Ralph Jaeger (Manager Licensing and Enforcement) advises CTD 13 Radio Operations field offices processed 1,841 new complaints of interference to television reception during the period 01/07/92 to 30/06/93. During the same period there were 395 complaints concerning interference to (AM) broadcast radio reception, 433 complaints concerning interference to FM band II (89-100 MHz) reception. The leading cause of interference was E.H.V. / H.V. power lines (TV/483 cases; 26.2% of all complaints). Second leading cause of interference was cordless telephones (TV/159 cases; 8.6% of complaints). Other significant causes included faulty or inefficient aerials (i.e., complainant's own fault; 61 cases or 3.3%), and computer created interference (33 cases, 1.8% of total). In a study of E.H.V. / H.V. cases, 52 local/regional power companies/firms were found to have correctable faults; the Waitemata power company has the dubious honour of leading the complaints-file listing with 106 complaints (21.9% of all E.H.V. / H.V. faults) of which 30 (28.3% of their total) were traced to loose hardware and 20 were traced to 'sparking shakles'. Without considering the size of the area served nor the number of customers, Waitemata was 11.41 times as prolific in creating complaints than the average of all 52 power companies. Auckland's 39 complaints (8.1% of E.H.V. / H.V.) was second 'worst'.

Official policy states "a significant proportion of complaints received are due to faulty or inadequate receiving installations"; 3.3% in the most recent year. And, "the broadcast service provider should not be expected to pay the costs for sub-standard aerial systems." RFS/ROG requires complainants to complete survey forms in advance of a visit by an inspector. The forms note "a direct charge to the complainant (will be made) where the receiving installation is at fault." Where "a genuine source of interference is involved and with no fault attributable to

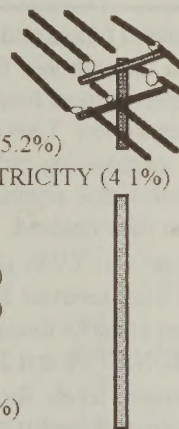
TOP 12 CAUSES OF TV INTERFERENCE

- # 1 / CORDLESS TELEPHONES (8.6%)
- # 2 / EHV / HV DISC INSULATORS (8.3%)
- # 3 / LOOSE POWER LINE HARDWARE (3.8%)
- # 4 / FAULTY/INEFFICIENT AERIALS (3.3%)
- # 5 / BROKEN POWER INSULATORS (2.6%)
- # 6 / EHV / HV KIDNEY INSULATORS (2.4%)
- # 7 / BROKEN POWER TIE WIRES (1.9%)
- # 8 / COMPUTERS (1.8%)
- # 9 / FAULTY TV TRANSLATORS (1.7%)
- #10 / PRIVATE 2-WAY RADIO (1.7%)
- #11 / FAULTY TV MASTHEAD AMP (1.7%)
- #12 / SALT/DUST LADEN INSULATORS (1.5%)

NOTE: OVERALL, EHV/HV sources 26.2%

TOP 10 SOURCES FOR INTERFERENCE (Power companies/areas at fault nationwide)

- # 1 / WAIITEMATA (21.9%)
- # 2 / AUCKLAND (8.1%)
- # 3 / HUTT VALLEY (6.4%)
- # 4 / EASTLAND ENERGY (5.2%)
- # 5 / DUNEDIN CITY ELECTRICITY (4.1%)
- # 6 / SOUTH POWER (3.9%)
- # 7 / ELECTRICORP (3.1%)
- # 8 / NORTH POWER (2.9%)
- # 9 / HOROWHENUA (2.7%)
- WAIKATO (2.7%)
- WAIKATO (2.7%)
- #10 / TAURANGA EPB (2.5%)



the complainant, the costs incurred (by the radio inspectors field trip) will be funded through the license fees paid by the service provider (i.e., the broadcaster)." Each TV broadcaster provides coverage maps for each transmitter site to RFS/ROG. "Complainants living beyond (this area) will not be visited unless they agree to pay the standard fee (currently \$54 plus mileage) for the service." The top fee charged (to Bob Russell, Coronet Peak RTUA, Queenstown) was \$842.40.

WHO OWNS/OPERATES OUR TELEVISION CHANNELS?

According to records from the Ministry of Commerce, New Zealand has 1,251 authorised television transmitters (not all are on the air) with 36 firms/groups owning the 'rights' to these channels. Not surprisingly, TVNZ controls 67.4% (843) of these transmitter-channels.

Under government auction, and legislation creating TV3, groups such as Cry TV Ltd. (Christchurch), Shureview Radio & Television Servicing Ltd (Mt Erin) and the Totalisator Agency Board/TAB have acquired 'rights' to specific transmission channels at specified locations. TVNZ operating TV1 and TV2 functions as an SOE (State Owned

Enterprise). In the most recent half-year (to 30 June) TVNZ had after-tax profit of \$14,288,000 on revenue of \$164,960,000 (8.66%). Of this, \$6,800,000 (47.6% of total) was returned to the government.

BCL UHF channels are considered an 'investment' by the firm/TVNZ, allowing the leasing of channel facilities to other firms who might wish to operate future television services (i.e., Horizons Pacific). In theory, any holder of bid-won 'management rights' for any (UHF) channel may operate the channel themselves, or, lease/rent out the channel to another operator.

Present engineering logic suggests that between 28 and 30 separate TV transmitter sites (i.e., channels) are required to cover 90% + of New Zealand's land mass and reach 98% of the population. Thus BCL, UCB and TAB have acquired sufficient channels for this purpose. SKY, with *three present* channels of service, would require 3 'x' 30 (90) transmit channels to reach the same land mass/population numbers. Most of the SKY transmitter sites (38 separate physical locations) have as a minimum 4 transmit channels 'owned', allowing the addition of a fourth programming channel in the analogue mode. However, there are exceptions from the 10 channels owned on Hedgehope and 8 at

NOTES: */ SKY is partially owned by TVNZ. **/ BCL is 100% owned by TVNZ	TELEVISION BROADCAST COMPANY # CHS # VHF % VHF # UHF % UHF % TOTAL						
	TVNZ / Television New Zealand	843	840	99.7	3	0.3	67.4
	SKY (*)	174	0	0.0	174	100.0	13.9
	TV3 Network Holdings	65	61	94.2	4	5.8	5.2
	BCL/Broadcast Communications Ltd (**)	39	0	0.0	39	100.0	3.1
	United Christian Broadcasters Int. Ltd	39	0	0.0	38	100.0	3.1
	Totalisator Agency Board. / TAB	36	0	0.0	36	100.0	2.9
	All Others	54	9	16.7	45	83.3	4.3

Waiatarua (Auckland) down to the 1 at Wanganui and the 2 at Levin. In the 'management rights auction' others also ended up with less than perfect national network 'mixes'; United Christian Broadcasters, for example, won single channels at most locations, none at Auckland's Waiatarua but 4 at Kaiti Hill (north of Taupo) and 4 at Peninsula Hill (Queenstown). TAB has single channels per location except at Waiatarua/Auckland where they have 2 channels. BCL engineering, which provided much of the planning for the Ministry of Commerce UHF channelling plan, estimates nine separate 'national networks' could function using the VHF and UHF channels as presently allocated within New Zealand.

Note that TV3's (as of 10 September) 65 transmit channels are all believed operational and additional channels have been reserved for their expansion whereas for others (such as TAB, SKY, UCB et al) the number of channels shown includes those operating *and* not operating (but owned). TV3 functions under legislation created *between* the old BCNZ/TV1 and 2 era and the present management right era. Russell (Bay of Islands), channel 11, newest added.

Power levels for authorised transmitters vary widely; from +64 dBw (eirp)/1.281 megawatts (erp) for three Sugarloaf located (UHF) transmitters to -25.2 dBw (eirp) / 1/1000th of 1 watt for a channel 9 translator at Minaret Station (South Island). Generally speaking, radiated power levels of 10,000 watts or more are required to produce 'penetrating signals' which saturate a coverage area such that individual viewers can get by with relatively modest home antennas. A high percentage of TVNZ 'channels' are low or very low power, serving small pockets of people with relatively weak signals; as illustrated here.

TV OPERATOR	TOTAL CHS.	% OVER 10Kw	TV OPERATOR	TOTAL CHS.	% OVER 10Kw
TVNZ	843	24 / 4.0%	BCL	39	21 / 53.9%
SKY	174	87 / 50.0%	UCB	39	21 / 53.9%
TV3	65	10 / 15.9%	TAB	36	21 / 58.3%
30 'Other' Firms	54	4 / 7.4%	AVERAGE / all	1,251	188 / 15.0%

CHANNEL LOADING

Across New Zealand 45 television channels (channels 1-11 are 7 MHz 'wide'; 27-62 are 8 MHz 'wide') are reticulated (used and re-used). Stations operating on the same channel (called 'co-channel') and next to one another ('adjacent' channel) must be spaced specified minimum distances apart to reduce or prevent interference between transmitters. These distances vary as a function of transmitter power (more powerful transmitters require greater separation between stations), the height of the transmitting antennas (greater height increases station coverage and also increases station separation requirements), and terrain (flat plains, or large expanses of water allow signals to travel further; mountains reduce station coverage).

When the New Zealand Broadcasting Service began planning television in the latter years of the 1950s, technical expertise came primarily from Europe. Band I (channels 1, 2 and 3) was deemed superior for television coverage because of its perceived benefits for hilly and mountainous terrain. When Band I transmitters were established to cover Auckland, Wellington, Christchurch and Dunedin Kiwi do-it-yourselfers were 'allowed' to build inexpensive TV translators which initially operated on band III channel 6. Ultimately the New Zealand Broadcasting Corporation established a national channelling plan for the entire country and the privately owned translators were largely taken over and upgraded by the Corporation. The present channel loading includes those organisations who have 'purchased' (UHF) channels under the management rights programme, but which are not yet operation. This summary is accurate by Ministry of Commerce records to 10 September 1993.

CHANNEL LOADING IN NEW ZEALAND / BY USER

CH.	'OTHER'	BCL	SKY	TVNZ	TV3	TAB	UCB	CH.	'OTHER'	BCL	SKY	TVNZ	TV3	TAB	UCB
1				16/3	2			43				9/5			
2				31/3	2			44	3			10/7			
3				49/3	2			45	1			11/6			
4	1			110/3	2			46	2			10/4	1		
5	2			71/2	0			47			9/5				
6	3			144/2	8/1			48	1		10/7	1			
7				94/2	8/2			49	3/2		9/4				
8	1			146/3	1			50	2		9/5		2	1	1
9	1			93/3	4/2			51	1		8/6				
10	1			69/0	22/4			52	2		11/6				1
11				20/0	14/1			53	1		8/5			1/1	
								54			11/4				3/1
27	1		9/5					55	2	1				8/4	
28			12/7					56	3		1			8/6	1
29	2		11/6					57	1/1					9/5	
30	3		11/4					58	3	1				9/4	2
31			11/4					59	1		2				7/5
32	1		11/6					60	1		3				8/7
33	3		11/6					61	2		2				7/4
34	2		10/4					62	1		3				8/4
35	Maori Reserved														
36	1	Maori Reserved													
37	Maori Reserved														
38	Maori Reserved														
39	Maori Reserved/Amateur														
40	1						1								
41	1														
42	1						3								

ABOUT CHANNELS 35 - 42

In addition to Maori reserved channels, interim rules allow community (non-profit) TV on channel 42 (41 Auckland) and low-power TV up to 1/2 watt (eirp) for schools, businesses.

ABOUT CHANNELS 35 - 42

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NOTE: **Bold face** (i.e., Ch. 8 TVNZ 146/3) indicates 10Kw or more (higher power) stations; see text.

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